Engineering Library

In This Issue—*An Advertising Fable*

JUL 8 1922

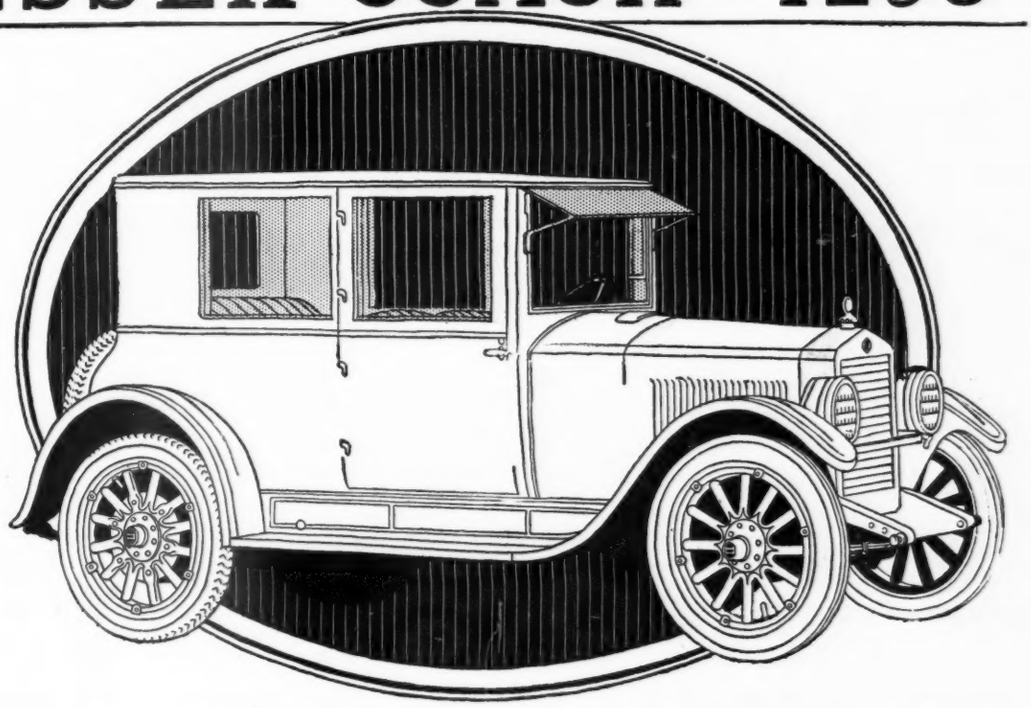
MOTOR AGE

Vol. XLII
Number 1

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, JULY 6, 1922

Thirty-five Cents a Copy
Three Dollars a Year

ESSEX COACH $1295



This is the Greatest ESSEX Year

Sales for the recent quarterly period increased by 310% over the same period of a year ago.

Production and sales for May were the greatest in company's history.

That Means Money for Dealers You Can Share It Too

ESSEX MOTOR CARS

Essex dealers, everywhere, are making money of course. There may be an opening in your territory. Wouldn't you like to handle this fast-selling car? If you want the franchise, act now.

ESSEX MOTOR CARS

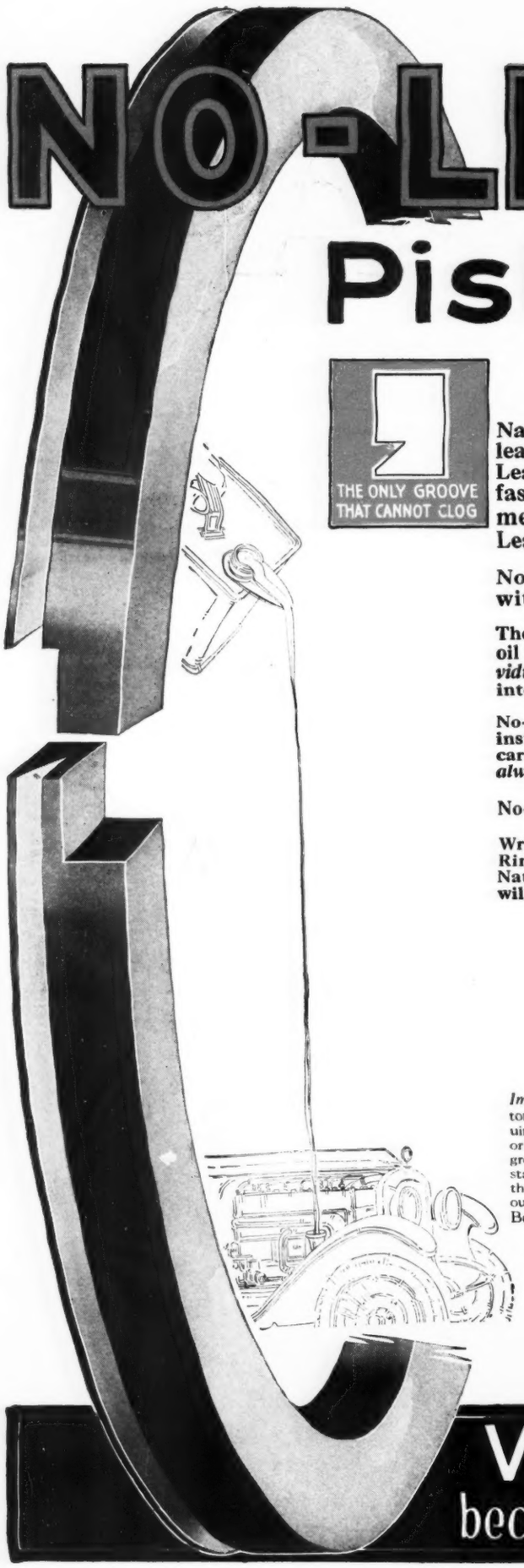
Touring $1095—Cabriolet $1195

ESSEX MOTORS DETROIT MICHIGAN

Entered as second class matter Sept. 19, 1899, at the post office at Chicago, Ill., under Act of March 3, 1879.

Wahl
Eng.
3-19-1923
eng.

NO-LEAK-O Piston Rings



THE ONLY GROOVE THAT CANNOT CLOG

Easy to Sell

National Advertising in the Saturday Evening Post and other leading periodicals is making it *easy for dealers to sell* No-Leak-O Piston Rings. Motorists all over the country are fast learning about the real *Saving* No-Leak-O Piston Rings mean to them. To-day, thousands are insisting upon No-Leak-O. They know that

No-Leak-O Piston Rings "won't leak because they're sealed with oil."

The specially cut "oilSEALing" groove—found only in No-Leak-O—prevents oil "pumping" and gives *perfect oil control and compression in each individual ring.* It prevents "unburnt" gas or kerosene from leaking down into crank case to weaken lubrication.

No-Leak-O Piston Rings are made in one piece—of finest material—easy to install—most economical—fully guaranteed. Over 200 reliable jobbers carry No-Leak-O Piston Rings in all sizes and *over* sizes. Prompt service *always*.

No-Leak-O is the *leading* replacement ring; it makes good on every job.

Write for interesting pamphlet "Know the Facts About Grooved Piston Rings." Let us tell you about our liberal dealer proposition and how our National Advertising can increase your profits. Quick action on your part will mean bigger profits.

NO-LEAK-O PISTON RING COMPANY

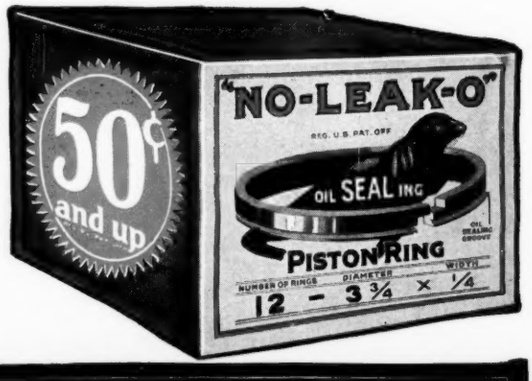
Dept. T-27

BALTIMORE, MD.

One Price During Eight Years of Continued Success

One design—for all cars—50c and up

Important—In buying piston rings insist on the genuine No-Leak-O with the original "oilSEALing" groove, packed in this standard package bearing the famous ring and seal, our registered trade mark. Beware of imitations.



WON'T LEAK
because they're sealed with Oil

MOTOR AGE

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MALLERS BUILDING
59 East Madison Street, CHICAGO

Vol. XLII Chicago, July 6, 1922 No. 1

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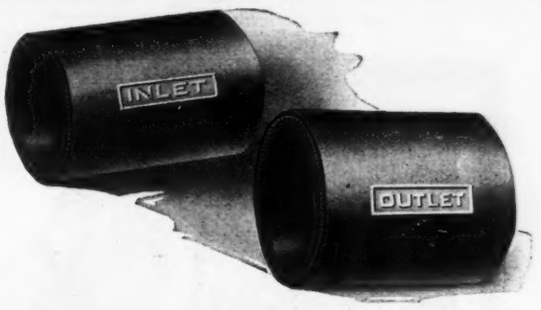


Goodrich Radiator Hose Specially Constructed for FORD Cars

Everything which goes into Goodrich Radiator Hose for other makes of cars goes into the special Hose for Ford cars.

Everything which resists the destructive heat of the motor.

Everything which resists the action of steam and hot water.

Everything which stands the action of oil.

Goodrich Radiator Hose for Ford Cars

is made of rubber and fabric which, through and through, in and out, end to end toes the line of sturdy performance. It actively resists every disintegrating element. It lasts.

Goodrich Radiator Hose for Ford cars gives long service and it gives good service.

Every Goodrich Branch can supply you. Better have some on hand.

THE B. F. GOODRICH RUBBER COMPANY
Akron, Ohio

Goodrich
RADIATOR HOSE

419824

The Radiator

for the Rolls-Royce car is built entirely in the Rolls-Royce Works at Springfield, Mass.

It is of the honey-comb, tubular type, built up from separate, seamless, solid drawn tubes—the strongest and lightest construction. It is guaranteed against everything except only damage by accident.

ROLLS-ROYCE

Radiators have superior cooling advantages. They cannot rust or clog—freezing does not injure them—they withstand road-shock, strain and rapid changes of temperature—they may be more easily and economically repaired, in case of accident, than any other type of radiator.

The Rolls-Royce driver is free of radiator troubles.

The top-tank, side plates and all other bright parts of the radiator are made of solid nickel silver, so that *they will always keep their color*. The radiator is supported on ball joints so that it is not stressed by the inevitable small deflections of the frame. All radiators are tested, under pressure, before being put on the car.

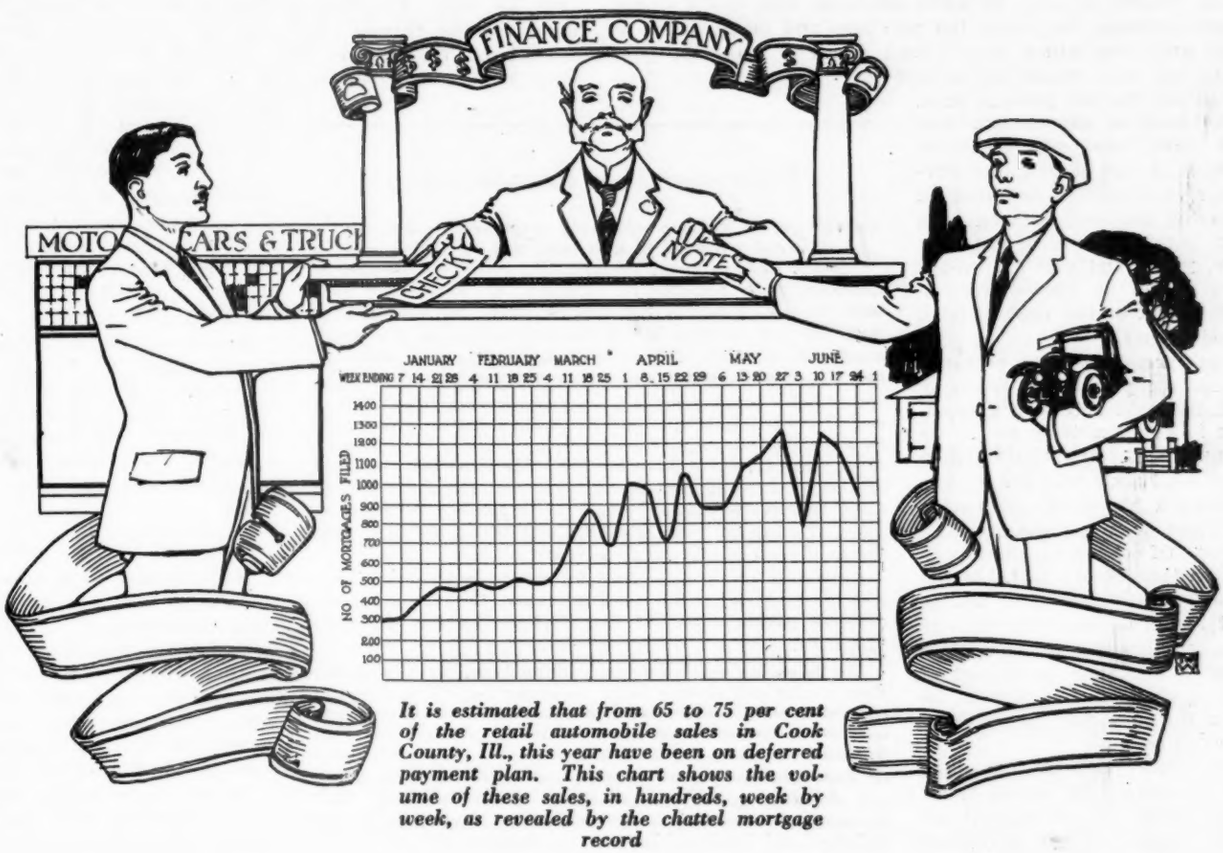
Write for "The Story of Rolls-Royce—Its Design, Workmanship and Materials"

ROLLS-ROYCE
of America, Inc.
SPRINGFIELD, MASS.

"Silent As Its Shadow"

Vol. XLII, No. 1 Chicago, July 6, 1922 $3 Per Year

MOTOR AGE



It is estimated that from 65 to 75 per cent of the retail automobile sales in Cook County, Ill., this year have been on deferred payment plan. This chart shows the volume of these sales, in hundreds, week by week, as revealed by the chattel mortgage record

How Dealers' Sales Are Kept on Cash Basis by Deferred Payment Plan

SYSTEM of Financing by Which the Automobile Banker Pays for the Car and Then Collects Over a Long Period from the Purchaser Has Had Remarkable Growth and Is Now Used in Approximately 70 Per Cent of Retail Transactions, Greatly Stimulating Business.

By SAM J. SHELTON

HOW the dealer gets cash for the car which the purchaser buys on time and how more and more automotive buyers are coming to use the time payment plan, although in many cases they could easily pay the full price at once, are interesting facts brought to light by a study of representative automobile financing companies, a number of which met at Indianapolis June 7 to adopt a constitution for a national organization.

The financing of automobile purchases on time has developed into a specialized form of banking, the magnitude of which is growing at a rapid rate. The head of one of the largest automobile manufacturing corporations in the United States, which has its own

subsidiary financing corporation, recently issued a statement calling attention to and explaining the reasons for the increasing extent to which automobiles are sold on the deferred payment plan. He mentioned that the automobile is the most expensive unit of merchandise being generally retailed to the public.

Money Not Available in Lump Sum

It is obvious that in many cases a man whose invested wealth puts him in a class well able to afford a good car finds it inconvenient to take from his business or from his investments, in a lump sum, the purchase price of the car he has decided to buy. In other cases, the man has a steady income sufficient to justify the purchase and maintenance of a car and from which he can well afford to make the payments, but who would not be able to buy a car at all if he had to pay the full price at once.

And then, as automobiles have been made better and stabilized as to style and design, the purchaser has come to feel that he is buying not for a season or a year, but for three or four, or more, years, and that his investment should be spread over at least a part of the contemplated period of use.

This specialized form of banking for the purpose of financing time payment sales of automobiles is comparatively new. Its beginning on anything like a widespread scale was about 1916, although a few of the companies may have been operating a little earlier. Of course, cars had been sold on time before that, but the cases were not numerous and in most instances the payment was to be completed in not more than three or four months instead of in from six to twelve months, as under the financing system now in operation.

The dealer not in immediate need of cash might extend credit at the usual rate of interest for a few months to the purchaser whom he knew to be in a sound financial condition and able to give collateral security. Such a transaction was regarded as a special favor to a preferred customer and not the usual business practice to be availed of by purchasers in general.

In some cases banks loaned money to good customers to buy automobiles, although the instances of refusal of such loans are probably more numerous than those of granting. Nor did the banks look with much favor upon notes taken by dealers in payment running over a period of several months. Although the automobile itself might be the collateral securing such notes, the plan did not fit well with general banking practices of short time loans and quickly convertible security.

Partial Payment Developed to Assist Sales

The business might have continued, however, in this fashion based mainly on cash sales with scattering cases of deferred payments by special arrangement, except for conditions which arose early in 1916. Factories had reached a high state of production and there was some talk of a "saturation point." About this time, according to a pioneer in the automobile financing business, the urge came from sales organizations for the development of a deferred payment plan in order to facilitate the marketing of the cars which were being produced in heretofore unheard of quantities.

There were at that time a number of corporations which had been engaged principally in financing the retail sale of pianos on deferred payments, whose business had suffered a severe setback and which were looking around for other lines. They looked with favor upon the possibilities of the automobile financing business in which the automobile itself would be the security upon which the money was advanced. There were other enterprising persons who saw the opportunity and could command the necessary capital to engage in a profitable business.

How the Plan Operates

The deferred payment plan of automobile selling quickly took form. This plan, in brief, is as follows: The purchaser pays a certain part of the retail price, usually 30 to 50 per cent, in cash. He then executes a series of equal monthly notes for the balance, including the charges for the accommodation. These notes are arranged so that the payment usually is completed in from six to twelve months. The purchaser gives a chattel mortgage on the car he is buying to secure payment of the notes. The notes bear the current rate of interest, usually 6 per cent. The dealer takes the notes and the chattel mortgage to the automobile finance company and receives in cash the balance of the purchase price of the car.

As far as the dealer is concerned, then, the transaction is a cash sale. He has received the full retail price and the customer has the car. The dealer has the money to apply toward more new cars and otherwise use in his business.

The Cost to the Customer

The customer is satisfied. Although the car has cost him a little more than if he had paid cash, he has possession of it to use in his business or for recreation and the additional cost has been spread over a number of months so that it is comparatively insignificant.

The extra cost to the customer varies somewhat according to the amount of the cash payment, the number of months in which payment is to be completed and the form of the notes. If the notes are only his own unendorsed promise to pay the finance company, with the car as security, his cost is usually a little higher than if the dealer from whom he bought the car endorses the notes.

As to the form of notes required, the finance corporations are of two kinds, "recourse" and "non-recourse." The recourse companies require the dealer's endorsement in addition to the signature of the purchaser. The non-recourse companies require only the signature of the purchaser. Of the companies in this line of business it is estimated by a man closely connected with the national organization that they are about equally divided as to the recourse and non-recourse method of doing business.

It is explained by persons connected with the recourse companies that this method is used to protect them against getting into the used car business. The dealer having endorsed the notes, the finance company can look to him in case the purchaser defaults and it devolves upon the dealer in turn to recover the car and sell it to protect himself. It is claimed also that this method causes the dealer to investigate more carefully the responsibility of the customer before agreeing to the sale.

Specific Example of Cost

On the other hand, the non-recourse companies claim that the extension of this sort of credit depends entirely upon the

Figures on Time Payment Sales

THE great volume of retail automobile sales on the deferred payment plan is indicated by the figures for such sales in Cook County, Ill., including the city of Chicago. It is possible to ascertain the number of such sales in any county in the United States, for the deferred payments are secured by chattel mortgages and the mortgages are recorded. The chattel mortgage record shows the number of such sales made within any given time.

In Cook County for the four weeks ending June 24 there were recorded 4,143 time sales of automobiles. The record by weeks ending on given dates was: June 3, 790; June 10, 1248; June 17, 1197; June 24, 908. The experience of dealers and finance companies indicates that the time sales in Cook County constitute from 65 to 70 per cent of the total sales. Taking the time sales as two-thirds of the total, then the total sales for the four weeks were 6,214.

Estimating the average loan by the finance companies at $500 on each car, which is conservative, the volume of the deferred payments for the four weeks in Cook County was $2,051,500.

The financing of dealers by making loans on cars on the floor was at one time a rather large part of the business of the automobile finance companies. This form of the business is declining rapidly, according to representatives of finance companies, partly because of voluntary withdrawal of financing companies from it and partly because banks are showing greater willingness to finance dealers. This financing by banks indicates increasing confidence in the stability and business integrity of dealers.

results of their own investigation of the character, financial condition and responsibility of the customer and that nothing would be gained by having the dealer's endorsement. Such companies do have cars come back on them, but it is said that the number is not so great as to cause any great difficulty in the disposal of them.

An example will show in a general way what the extra cost to the customer amounts to. Suppose the customer is buying a car the retail price of which, including tax and extras, is $2500. He agrees to pay 40 per cent down and the balance in 10 equal monthly payments. For financing the deal on these terms the financing company will make a service charge of five per cent of the price of the car. This is $125, which is added to the retail price, making $2650. The down payment, then, is 40 per cent of $2650, or $1060, leaving a balance of $1590 to be paid in 10 equal monthly payments. These notes will bear six per cent interest. The cost will be further increased slightly by the mortgage recording fees and revenue stamps. In some of the larger cities these fees are around $3 or $4, but in other places they are less. These fees may be paid outright by the purchaser or may be included in the principal for which notes are executed. The purchaser is required also to carry fire and theft insurance, the premium for which may be paid outright or included in the notes. A higher rate is charged for financing used car sales.

Hazards and Profiteering

The companies engaged in this business figure that, including the service charge, the fees and the interest paid, but not the insurance premium, the customer pays about 18 per cent for the money actually advanced in his behalf. Nevertheless, they say, due to the nature of the business, the hazards and the overhead, their net average profit is only about one-half of one per cent on the volume of business done. The annual volume of business of the average company is about three times the amount of its available capital, as there are about three turn-overs a year.

There have been hazards a plenty for the companies which pioneered in this business and there also has undoubtedly been some profiteering not justified by the hazard. There have been cases of cost to the customer running up to 36 per cent, or more, for it has been the practice of some unscrupulous companies to get all they could and there have been some buyers, possessed more strongly with desire than with judgment, who have contributed to such unwarranted profits.

Elimination of frauds, reduction of hazards and establishment of better ethical standards for the business are objects of the national association of automobile finance companies which met at Indianapolis. About 100 companies were represented, but these are by no means all of the companies in the business, for the association is new and has not extended its membership much beyond the cities of New York, Chicago and Indianapolis. In these cities local associations are operating effectively.

Financial Plan
Covering
Packard – 6
Open Car

SCHEDULE No. 2.—

	Down Payment			
	33⅓%	40%	50%	66⅔%
Six Months	4 %	3⅓%	3 %	2⅓%
Eight Months	5 %	4 %	3½%	3 %
Ten Months	6 %	5 %	4 %	3⅓%
Twelve Months	7 %	6 %	5 %	4 %

CLOSED CAR RATES ARE ½% LOWER

EXAMPLE

Sale Price of New Car, including extras	$2500.00
Tennant charges (50% down, balance 10 months) 4%	100.00
Total	$2600.00
Down Payment—50%	1300.00
Balance in 10 equal monthly payments	$1300.00

USED CAR SCHEDULE

1919 1920 1921 Models Only
Minimum down payment 50% of Sale Price plus TENNANT charges.

Six Months	7%
Eight Months	8%
Ten Months	9%

Some cars take a lower rating; phone Calumet 0266, and ask service salesman for quotation.

We reserve the right to limit the amount we will advance in certain cases. Not more than ten months allowed on used cars.

Example of time payment financial plan used by one company for a Packard car. This also shows rates for used cars, which are higher than for new cars

CONFIDENTIAL INFORMATION

For use as required by Leading Merchants in opening charge accounts.
References will not be informed that you are purchasing an Automobile on Time Payments.

To obtain credit on the purchase of an Automotive Vehicle, I make following authentic declaration:

Name in full ..... Date ..... 192..
Home Address .....
City ..... Res. Phone ..... Nationality .....
Age ..... Married or Single ..... Number of Children or Dependents .....
Company Name or Employer .....
Business Address ..... Business Phone .....
What Dept ..... Business or Occupation ..... Foreman or Manager .....
Do you own interest? ..... How much? ..... Years in Chicago? .....
How long in Present Position ..... Monthly Income $ .....
How long in Previous Position and Name of Employer? .....
Checking Account at ..... Bank
Savings Account at ..... Bank
Own Real Estate? ..... Address ..... Value $ ..... Mortg. $ .....
Have you ever purchased a car on time payments? ..... What Make .....
From Whom? ..... When? ..... Have you paid account in full? .....

References and Charge Accounts (give three or more) also name of landlords

Name	Address	Phone

RELATIVES

Name	Address	Relationship	Phone

Car will be kept in Private (Public) Garage at ..... Street
Car will be used for Business ..... Pleasure ..... For Hire .....
SIGNATURE .....
N. B. Salesman will please fill other side. (see over)

Confidential information blank used by one automobile financing concern to get necessary data from customer seeking credit

Method of Preventing Fraud

One of the methods of preventing fraud is to make a card index of all cars, giving make, model, engine number and name of purchaser, for which chattel mortgages are filed. Duplicates of these cards are sent to a central office in New York, where they are carefully checked to see that the same car is not security for more than one chattel mortgage.

Before this system was adopted it was not infrequent to find several mortgages on the same car, in some cases the dealer being the perpetrator of the fraud and in other cases the owner. Some finance companies actually found that the same car was security for more than one set of notes held in their own files. This form of fraud has been virtually eliminated so far as the companies co-operating in this work are concerned.

It was also found that some unscrupulous dealers had been using cars on the floor to obtain advances from more than one source. Such practices were quickly detected through the exchange of information among members of the association. One man connected with a finance company related an instance of a dishonest dealer who having been separated from one business connection was looking for another. He was about to close an arrangement to represent a large manufacturer when the matter came to the attention of the finance man, who immediately got in touch with the sales manager of the factory. The result was that the dishonest dealer was still without a business. This dealer learned the cause of his failure and called on the finance man. When he was confronted in detail with his record he slunk away.

Record Kept of Purchasers

Not only is this sort of information exchanged as to dealers but also as to individuals, just as is done in the credit associations of other lines of business. It has been found that when a man once buys a car on the time payment plan he is likely to do so again within a reasonable time. If he remains

in the same locality and the transaction has been mutually satisfactory he is likely to remain on the books of the finance company with which he started. But if his record in the first transaction is not clean the fact will be known to other finance companies in the association.

How carefully the finance companies investigate the personal and business circumstances of the purchaser is shown by an examination of the process of initiating and completing the transaction. The man desiring to make the purchase on the deferred payment plan is required to fill out a blank giving the following information: Full name, home address, nationality, phone number, age, married or single, number of children or dependents, business or employer, business address, business phone number, occupation, how long a resident of the city, how long in present and previous positions, monthly income, banking connection, whether or not he owns real estate, whether or not he ever before purchased a car on time payments, name of landlord, names of relatives and three references, where the car is to be kept and the use to which it is to be put.

Customer Carefully Checked

With this record in hand the finance company makes a careful investigation to check every statement made by the customer and to get any possible information of value from the references named. This investigation usually is carried on in such a way as not to disclose the purpose for which the customer is seeking credit. If the facts check all right and the reports from the persons named as references are favorable, the transaction usually is approved without further action. In some cases, however, the customer is called in and questioned, especially if there is doubt as to his ability to pay.

One finance man related the case of a carpenter with four children who wished to buy a medium priced car and make monthly payments of about $60. The man and his wife were called in. After it was learned that the wife conducted a delicatessen while the husband put in his time at his trade the transaction was approved.

There was another case of a truck dealer who had been accustomed to financing all his time sales through a certain finance company. One day he approached another finance company and the latter, knowing the dealer's connection, called up the first company to ask what was the matter. Both were members of the association. An investigation was made and it was learned that the person to whom the dealer was trying to sell the truck intended to use it for an illegal purpose for which it might have been seized and confiscated by the Government. The finance companies argue that in protecting themselves in this way they are able to reduce the hazards of the business, and make lower rates, and that in eliminating the dishonest dealers they are performing a service for the honest dealers, for the buyers and for the industry as a whole.

Deal Between Purchaser and Finance Company

When an individual transaction has been approved the finance company causes a chattel mortgage covering the car to be drawn up and when this has been signed and delivered the dealer is given a check for the unpaid balance of the retail price of the car. Thereafter the transaction is between the purchaser and the finance company. The purchaser makes his payments at the office of the company and receives from it his canceled notes. The finance companies maintain elaborate machinery for sending out notices and in cases of defaulted payments they exhaust every resource before finally taking legal steps to recover the car.

The growth of this business has been remarkable, especially in the larger cities. C. L. Wolf, secretary of the Central Automobile Financing Association at Chicago, estimated that there are 250 to 300 concerns of considerable magnitude engaged in the business in the United States, in addition to many smaller ones. The 100 or more firms represented at the Indianapolis convention estimated the volume of their business this year will exceed $1,500,000,000.

Proportion of Time Payment

It is impossible to get accurate figures showing the proportion of automobile sales made on the deferred payment plan. It is variously estimated at from 50 to 75 per cent. W. G. Tennant, a pioneer in the business in Chicago, estimated that last year the proportion was 50 per cent and that this year it is nearly 70 per cent. The medium priced cars furnish the greatest proportion of the time payment business, he said. It was his experience that of the cars in the highest price class only about five per cent were sold on time. Also of the cars in the lowest price class a comparatively small proportion are sold on time. The bulk of the deferred payment business is between these extremes, he said.

Some men of considerable wealth who buy cars rather frequently use the time payment plan, it was learned. Sometimes this is because their funds are tied up so that they receive their income only at stated intervals and in other cases it is because they find this the most convenient method without using funds which may be more profitably employed in their business.

One company has as a customer a hotel proprietor who buys a new car every year. After making his cash payment, to-

Schedule of Payments

$.....due 1 mo. after date
$.....due 2 mos. after date
$.....due 3 mos. after date
$.....due 4 mos. after date
$.....due 5 mos. after date
$.....due 6 mos. after date
$.....due 7 mos. after date
$.....due 8 mos. after date
$.....due 9 mos. after date
$.....due 10 mos. after date
$.....due 11 mos. after date
$.....due 12 mos. after date

$..... City and State..... Date.....192.....

For Value Received, I (We).....jointly and severally,
Purchaser's Name
promise to pay to the order of **MYSELF (OURSELVES)** at the time or times stated in the schedule of payments hereon $..... Dollars
Total Unpaid Balance
at 2447 Michigan Avenue, Chicago, Illinois, with interest after date on each installment at the rate of six per cent per annum until maturity and after maturity at the highest rate allowed by law together with exchange and collection charges at current rates.

In the event purchaser defaults on any of the scheduled payments, or a proceeding in bankruptcy, receivership, or insolvency be instituted against the purchaser or his property, the full amount then remaining unpaid, shall, at the election of the holder, become immediately due and payable. This note shall become due and payable when and if default is made in the payment of any installment scheduled hereon.

To secure the payment of said amount the makers, endorsers and / or guarantors and / or each of them jointly and severally hereby authorize irrevocably any attorney of any court of record to appear for the makers, endorsers and / or guarantors and / or each of them in such court, in term time or vacation, at any time hereafter, and confess judgment without process in favor of the holder of this note for such amount as may appear to be unpaid thereon together with costs and such reasonable attorney's fees as the court may deem just and proper and to agree that no writ of error or appeal shall be taken or prosecuted from said judgment and to agree that no bill in equity shall be filed to interfere in any manner with the operation of said judgment and to waive and release all errors which may intervene in such proceedings, including the entering up of said judgment and the issuing of execution thereon, and consent to immediate execution upon such judgment, hereby ratifying and confirming all that said attorney may do by virtue hereof.

Presentment and demand for payment, notice of non-payment, protest and notice of protest are each and hereby waived by the makers, endorsers and guarantors jointly and severally. Any indebtedness owing from the payee or legal holder hereof to the undersigned or to any endorser or guarantor may be appropriated and applied by said payee or legal holder on this note at any time either before or after maturity of this note and without demand upon or notice to anyone.

This note is secured by Chattel Mortgage, executed by the maker hereof, and bearing even date herewith.

Signed.....(Seal)

Signed.....(Seal)

Some automobile financing concerns use a single note to cover the time payment purchaser's indebtedness, the schedule of monthly payments being shown on an attached coupon

ward which the old car usually is applied, he has the finance company compute the maturity value of each of the 12 monthly notes and he deposits with the finance company 12 checks to cover the respective notes as they fall due. This purchaser is relieved of any further trouble about the transaction and the finance company has only to present the checks as the dates come around.

This Plan Minimizes Detail

A large part of the money used in this business is borrowed by the finance companies from the banks. As a rule the capital of the companies is not large enough to permit them to operate profitably if they were restricted to the use of their capital alone. These companies are able to put up with the banks, customers' notes as collateral and obtain money at the regular commercial, or a slightly higher, rate of interest.

The question naturally arises, why do not the banks make the loans directly to the purchasers, through the medium of purchasing the customer's notes from the dealer and thus give the purchaser the benefit of a lower rate of interest? The answer, the finance men say, is found in these facts:

The banks want short term notes which the finance companies give, rather than the long term notes given by the automobile buyer; through the finance companies the money loaned for this purpose is concentrated in a few transactions rather than scattered in many small and troublesome accounts; the finance companies have the organizations to investigate the responsibility of the many note makers, thus relieving the banks of this task.

Financing Done by Mail

One company which borrows a good deal of money from banks to finance automobile sales puts up $12,500 of customers' notes as collateral to secure its serial trust note for $10,000, with interest at six per cent. It is thereby able to discount its own serial trust notes, running for as long as six months, at the banks and obtain cash to carry on its business.

The facilities of this time payment plan are not limited to the dealers who reside in the communities where the companies are located. Most of the larger finance companies now operate by mail within a reasonable radius of their central offices and some of them maintain branches offices where business is conducted independently of the central office. Dealers located at some distance from one of these companies may forward applications to the company by mail, the company then conducts its investigation and if the transaction is approved the check is mailed to the dealer.

Some Dealers Charge for Time Service

Some dealers make it a practice to charge the customer a flat price for the time payment service. This charge is always somewhat more than the finance company's charge, leaving the dealer an additional profit. For instance the flat price for the service, to be added to the price of the car, may be $125 when in fact the finance company's charge and the fees will total only $100. In this case the dealer makes an additional profit of $25. Other dealers prefer to let the customer see just what the finance company's rates and charges are and have him pay only that amount.

The finance companies take various corporate forms. In New York most of them operate under the state banking laws. In most other states they are either organized under the general corporation laws or as common law trusts.

Their remarkable growth is the best index to their importance as an aid to the sale of automobiles.

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40 Per Cent of Automobiles Stolen in 1921 Not Recovered

Figures Compiled by N. A. D. A. Show Thieves Gaining on Law Officers in Efficiency

ST. LOUIS, July 1—Automobile thefts seem to keep right along with automobile production, according to statistics of 28 index cities for which complete four-year figures have been kept by the Naaional Automobile Dealers Assn.

These 28 cities show that 37,554 motor vehicles were stolen in 1921 and 21,273 recovered. The number unrecovered was 40 per cent of the total, the highest noted in the four years, indicating that the thieves not only are keeping abreast of the production, but forging ahead of the police departments and the legislative bodies in means devised to safeguard the owner.

A summary of the four-year figures for the 28 cities follows:

	1918	1919	1920	1921
Stolen	27,445	33,508	30,046	37,554
Recovered	21,673	24,740	21,273	26,517
Unrecovered	21%	26%	29%	40%

New York again heads the list with total number stolen, 6,808. Chicago is a close second with 6,799. Chicago recoveries, 4,438, however, were greatly in excess of the recoveries in New York, 3,451. Twenty-one cities showed a greater number stolen in 1921 than in 1920. Cleveland, Portland, Oregon, Seattle, Salt Lake, Columbus, Ohio, York, Pa., and Richmond, Va., showed fewer thefts in 1921 than in 1920.

"The greatest handicap under which the police are laboring in the recovery of stolen vehicles," according to C. A. Vane, general manager of the association, "is lax enforcement of laws to punish motor vehicle thieves. Courts are unduly lenient with this class of offenders. Charges are continued against such law-breakers until the patience of the witnesses is exhausted, finally resulting in dismissals and nolle prosequis."

A tendency was also noted during the 1921 depression, for owners of insured vehicles to conspire for the disappearance of the vehicles in order to collect the insurance. Numerous cities over the country reported the recovery of motor cars from quarries, pits and rivers, that had been reported stolen and which the police declare were clearly disposed of, with the connivance of the owner.

The detailed four-year record for the 28 cities follows:

AUTOMOBILES

	STOLEN				RECOVERED			
	1918	1919	1920	1921	1918	1919	1920	1921
New York	3,340	5,527	5,179	6,808	2,578	3,124	2,717	3,451
Chicago	2,611	4,447	5,974	6,799	1,954	3,447	4,340	4,438
Detroit	2,639	3,481	3,300	3,732	1,934	2,529	2,563	2,410
Cleveland	2,076	2,338	2,649	2,304	1,816	1,786	1,765	1,532
Los Angeles	1,629	1,688	1,654	2,333	1,499	1,365	1,152	1,725
Kansas City	1,144	1,661	801	1,577	606	794	341	1,153
Portland, Ore	1,088	1,528	465	338	990	1,378	418	303
Denver	901	1,440	858	1,862	627	1,187	651	1,711
San Francisco	1,122	1,354	1,186	1,652	1,082	1,304	1,156	1,608
St. Louis	2,241	1,241	788	1,560	1,354	944	641	1,247
Seattle	1,451	1,422	1,008	861	1,376	1,398	900	710
Indianapolis	404	1,031	1,152	1,238	334	692	833	979
Boston	866	1,002	480	490	607	580	297	216
Salt Lake City	797	776	592	516	790	758	555	482
Oakland, Cal	895	760	564	729	860	733	549	680
Omaha, Nebr	1,039	734	634	927	669	567	507	855
Columbus, O	451	550	513	408	352	373	278	355
Cincinnati, O	348	520	525	741	291	293	273	445
Oklahoma City	571	149	205	493	484	70	133	396
Albany, N. Y	41	133	87	234	29	104	70	177
Buffalo, N. Y	1,262	986	743	1,152	914	700	507	928
Newport, R. I	4	9	12	14	4	9	12	14
York, Pa	6	10	8	2	6	9	8	2
Grand Rapids	152	189	262	267	149	137	250	207
Richmond, Va	84	207	148	130	62	161	93	100
Dayton, O	207	228	198	227	241	213	217	243
Lowell, Mass	26	25	18	36	16	17	7	31
Evansville, Ind	50	72	43	124	49	68	40	119
Totals	27,445	33,508	30,046	37,554	21,673	24,740	21,273	26,517

UNRECOVERED

1918, 5,772—21% of number stolen.
1919, 8,768—26% of number stolen.
1920, 8,773—29% of number stolen.
1921, 16,281—40% of number stolen.

Fable *of the* Embryo Promoter *who* Had a Big Idea With *Only* One End

By TOM WILDER

With Apologies to George Ade

ONCE there was a Piker named Clarence who Grew Up in a Single Barreled town. He undoubtedly should have been an Ad. man but opportunities were scarce at the Cross Roads so his abilities languished. He would have had no desire to Barter his Soft Berth for a drop light, pen and desk room in some smoke begrimmed city had he known, and no one had ever Piped him off.

Though born with the instincts for publicity fate had made him Prop. of a small Garage, the kind which evolves by degrees and without assistance, for in the old livery days, Clarence's father had conducted it as the Palace Boarding and Sales Stables.

Aside from the removal of Stalls and Hay Lofts and the addition of a few sections of concrete as the old wood floor rotted away, little or no change had been made in the building since its demise as a hostlery of the Swell Turnouts of former days.

The harness room had been transformed, by the removal of the pegs and the addition of a few shelves, into a stockroom for a few accessories which were kept safely under lock and key awaiting demand. No attempt was ever made to push sales by displaying goods or Asking 'Em to Buy.

However, things were generally Pretty Soft for Clarence as the Old Man had left him the stable (alias garage) and the homestead absolutely free of Indebtedness which is going some in these days of doing business on Borrowed Money.

There was no monthly scramble to meet the Rent Man and no Semi-Annual Notes coming due. Other expenses were also light, the Movie house at South Riley, the nearest theatrical Center, was content with 10 cents per, so that Clarence could take his girl to the Movies, indulge in Soda after the play and Get Away With It for little more than Two Bits.

To offset all these Extravagances enough strangers were stranded in town over night and enough steady storage customers patronized the garage to allow Clarence to Break Even.

Clarence had drifted along pretty much as his father had done, neither had ever tried to Push business, all the business they got Pushed them into taking it.

As Clarence grew more mature, however, his wants increased. Flappers who craved Movies and Sodas no longer appealed to him and he found himself seeking the company of the more Highbrow Boarding School Product. Occasioned trips to large towns and Summer Resorts in quest of these higher grade Cookies furnished uses for money that he had never known before and pushed the resource of the old garage beyond its normal ability.

As explained in the beginning Clarence was by nature an Advertising man so when he decided his income must be increased his first thought was to advertise. He didn't exactly know how he would profit by advertising but he

thought of Wizard Oil, Lydia Pinkham, Armour's hams and numerous other successful Creators of Desire; why not Clarence McCoy. He had no ideas of Follow-up or merchandising as a whole but he figured that if he got people thinking about his place and kept them at it long enough Wealth would come his way in some form or other. Of course, he didn't think this out logically; he just felt it and acted.

His first attack was on his unsuspecting townsmen through the columns of the Saturday Review, the local paper. He had contracted for enough space to get the Lowest Rate and proceeded to use it up.

The first Ad. was a Knockout in the boldest type the shop possessed and Made the startling Announcement,

PALACE GARAGE
135 MAIN STREET,
Clarence McCoy, Prop.

It certainly looked All the Gravy to Clarence whose hat band was already beginning to tighten. But Pride Cometh, says the Poet, before one steps on a Banana Peeling. The paper was hardly off the press before all the town Wags were out cocking their heads and making remarks such as, "I see by the Paper They's a New Garage started up on Main St." "That So? I ain't seen no building operations goin' on;" or, "Bill, How long does it take a livery stable to turn into a Garage?" In the course of a few days one old timer got him aside and said, "Clat! What be yer a wastin" yer money on them ads fer. Don'cha know every man in this here town as has money enough to have his otymobile kept for him knows about this here place? Most of 'em know'd yer pa before yer was born. Bein' ez how they knows it what's the sense in spendin' money tellin' 'em over again. If yer tryin' to talk t' them city fellers t'aint no use; they never sees the Review anyway. If they get stuck here Mrs. Andrus at the Hotel 'll always send 'em over. Ef yer got any money t' spare why don't yu give some t'her; she's done yu many a turn."

Now Clarence didn't have any Competition at all in town; there was one small dealer in accessories and tires but he didn't sell any more than Clarence because he had no garage or other interest to Attract Trade though he did have a neat little store. Not having any competition in the garage business Clarence realized the Old Timer was just about right. Try as he might he couldn't think of a Soul who didn't know him and his father before him. Consequently, he cancelled his contract with the Review and paid the Short Rate.

But—What To Do! If he had already captured all the trade in town he would have to do one of two things to get more. Either sell out and move to a bigger place or devise some way of Sandbagging the transients and tourists. Newspapers and magazines were out of the Question because he would have to talk to every motorist in the U. S. to include those going through his corner of the township and that would cost too much money.

Signs were the thing but nobody can read enough as they run to do any good. To be effective signs must contain only a Few Words and to the point.

After many weeks of exercise on the part of his Advertising Entity, Clarence finally Pulled a Novelty on the motoring public that made it Sit Up and Take Notice because it couldn't escape. He patterned his campaign after the primer. He never put more than one or two words on one sign and placed them

along the road 15 or 20 ft. apart on fence posts so that that there were a series of signs to every phrase. Instead of John's-dog-Ran-after-the-cat, Clarence's Primer read, Gas - Oil - Grease - Service - Palace Garage, or Tires-Tire Service-Air-Palace Garage, or Road - Information - Palace Garage.

Naturally tourists were all Worked Up by the time they reached town; the system was so novel and convincing they had their wants all catalogued and the money in their hands. Even though their needs were Nix, they planned to take the opportunity of buying from so progressive a dealer even though it was nothing but gas or oil. They had their lookouts all posted and their feet set on the pedals to make a landing at the pier of the Palace Garage the Moment the lookout piped down the Course.

One is just about as liable to mistake a Junk Shop for a castle as to pull up to a 1882 livery stable while seeking a garage that will match a mental impression of something palatial so most of Clarence's well directed prospects went wild. Many were still looking for the Palace Garage when they found themselves again out in the country. A few needed supplies bad enough to stop at any kind of place and it was 50-50 whether Clarence or his Competitor got the business since neither stacked up to the signs.

Clarence couldn't Tumble to why his Campaign didn't Function but assumed that motorists as a whole Don't Believe in Signs. While absolutely false, his theory fit the facts, so he accepted it and gave up all hope of becoming a Big Toad in the Home Puddle.

Now Clarence had never been Pinched for being aggressive so when his Ship came in and forgot to stop he was inclined to say "oh, well, easy come, easy go" and let that end it.

But not so a certain other Young Person. She,—for it was indeed a female of the species—had not been reared in somnolence as had Clarence, but had grubbed hard for everything she got. While she had not been obliged to support a widowed Mother or Pull any of the proverbial Sob stunts she had been obliged to Watch the Corners and Count the pennies carefully in order to get the education she wanted.

All this had sharpened her wits until brass tacks were dull in comparison and what she didn't see just wasn't there—that's all. Nobody would ever call her a Doll or a Sweet Patootie or The Pastry or anything else in that line but she was There with a Bean full of Brains carefully tucked away under a wavy mass of the Beautiful Brown and behind a pair of the beautiful Hazel-Gray. She was a good looker and what might be called a Humdinger, when she entered, all the Cake Eaters stopped Spoofing and tried to sit up and look intelligent.

Now Clarence and this certain young person who in the Home Town had been unable to live down the name of Betty, though known abroad only as Miss Beatrice Collingwood, had become very close friends—entirely Platonic, of course. Naturally Betty had all the Dope on the Big Advertising Idea and had been proud of Clarence and his creation and hopeful of its success, so when she saw him about to Lay Down on the job she got speedily into action. She organized a Research Club of Two and elected herself president with instructions to find the missing link between advertising and Returns.

On the quiet she took the family Flivver and started to gather data. First she planted the Bus beside the road while traffic was heaviest just where there might be remarks made after passing one of Clarence's signs. After making Copious Notes she moved to other locations. In this way she not only discovered which signs produced the most comment but which were real knock-outs and which Fell Flat.

She hadn't been Sleuthing long before she found that the Advertising end of the Combination was O. K., so she moved to other fields of Research. Taking up her stand at various places along Main St. and at the approaches to town she listened long and intently for chance remarks and bits of conversation that would give her the Dope.

It might be remarked in passing that Betty had her own Hunch of the trouble and was probably a good enough friend to Clarence to be able to tell him without any ill feeling but she wanted Definite Proof that she was right; then she could show him the Error of his Ways, Sell him on the Remedy and get his Signature on the Dotted Lines before he could have an opportunity to Flop.

When she had the Case all Framed Up and Embroidered she sounded the Call for Dinner and filled our Hero so full of Chicken Pie, Salad and entertaining conversation that he was supremely happy.

When he had lighted his favorite cigar and thought he was Sitting Pretty she Opened Up, saying, "Your Committee of Research into the Failure of the Advertising Campaign of Palace Garage had finished its investigation and is ready to report. What is your pleasure?"

Clarence almost fell out of the Morris Chair but knowing Bettie's style he prepared himself for a big Bump and said Simply "Shoot, Daws, We must know the truth at any Cost." Thereupon she gave a very complete summary of her work, quoting the overheard conversations which did not make so much of a Hit with Clarence when they were directed at his Garage as they did when commenting on his Signs. In Conclusion she said:

"Now, Young Man, I am sure I have pointed out the Fly in your Ointment. I am also sure a considerable Pepping up will be necessary before your ancestral place of business will Flag the Weary Tourist and Separate him from his Coin. It was all very well in 1906 when Dobbin was King of the Highway but these Modern Touring Epicures are different. They remember the Polychrome, Terra Cotta front they patronized for Free Air in Ferris Falls or KoKopo Creek and when they see your signs they Flash a mental Picture of arched porticos with Close-ups of plate glass showcases and Mosaic Inlaid gas pumps. Of course, you can't help it if those Birds have been Spoiled but they have been and the least you can do and Stick is Keep up with the Procession.

"Following this line of thought I have had a Competent Architect plan and estimate the cost of a Frontal Icing that will make a Big Dent in the daily events of any tourist no matter how Blasé. There are Gas and Oil facilities, irresistible Accessory displays, Women's Restroom, Convenient tire, battery and Adjustment Service—Everything Complete."

Clarence was Flabbergasted, Nonplussed and Speechless. Evidently this girl knew more of the fine points of the Garage Business than he, anyway, she had struck 10 on a Bum Alley and he resolved then and there to let her Finish the Game if he had to Mortgage the Homestead.

"You're There, Kid" said Clarence, "And as there seems to be a place for a Man of your Mental Caliber around the Palace Garage, I am going to ask you to accept the Vice-Presidency of the Palace Garage Company which we will incorporate tomorrow, then you can carry out your plans without any interference from me."

Reverting to the Feminine Instinct she replied "Oh, Clarence. This is so sudden" but after a pause "I'll warn you now to watch your step or you may wake up to find me President."

As Clarence walked home that night he decided she was Queen.

Moral—It's often the Follow-Up that Yields the Beeswax.

Latest Developments in Trucks, Tractors and Equipment

Stewart Utility Wagon With Maximum Capacity of 1¼ Ton

THE Stewart Motor Corp. announces its new Utility Wagon. It has 34x 4½ cord tires all around, a three bearing Buda 3⅝ by 5⅛ in. motor designed particularly for speed truck work. It is of the removable head type. The cylinder block is also removable. This engine is rated at 21.03, S. A. E. horsepower. The motor has a full pressure feed oiling system to crankshaft and connecting rod bearings, with oil pressure gage on instrument board.

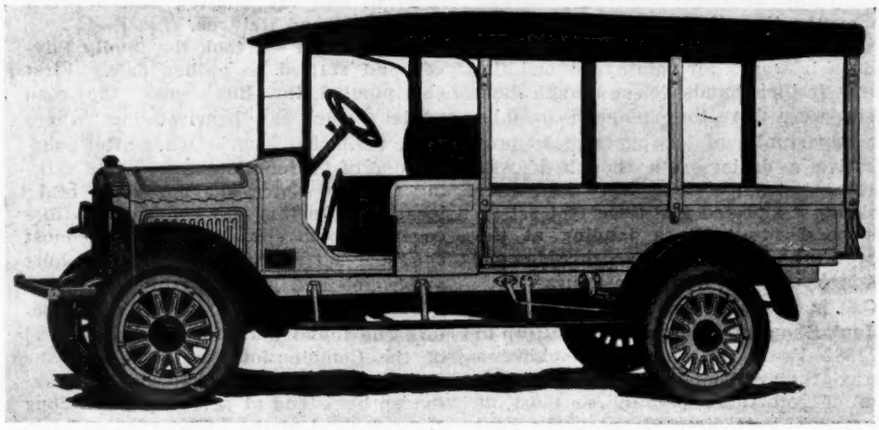
The cylinders are cast enblock and provided with ample water jacket space which is baffled so that water is discharged directly beneath the valves and designed to secure complete circulation around each valve and cylinder. The cylinder head is provided with a ledge projecting beyond cylinder block, and lugs on each end of cylinder and head are provided for breaking the joint and for the purpose of eliminating possible injury to gasket.

The rear axle is the Clark internal-gear drive, the same as used on other Stewart models. It is geared 5½ to 1.

The front and rear springs are semi-elliptic in type, 38⅝ and 50 2¼ in. wide respectively. Rear spring has 15 leaves and is equipped with full length rebound plate bronzed bushings, and hardened steel pins are used throughout. Spring lubrication is by Alemite system.

The regular equipment consists of electric lights with lenses equipped with focusing device, electric tail lamp, tool box, 111 hour storage battery, tool jack, electric horn, oil gage, front bumper, ammeter and dash light.

Price of this chassis complete with the above equipment is $1,245.00 plus war tax f. o. b. Buffalo.



Stewart Utility Wagon with 1¼-ton rating. Price of chassis, $1,245

New Cultivating and General Utility Tractor

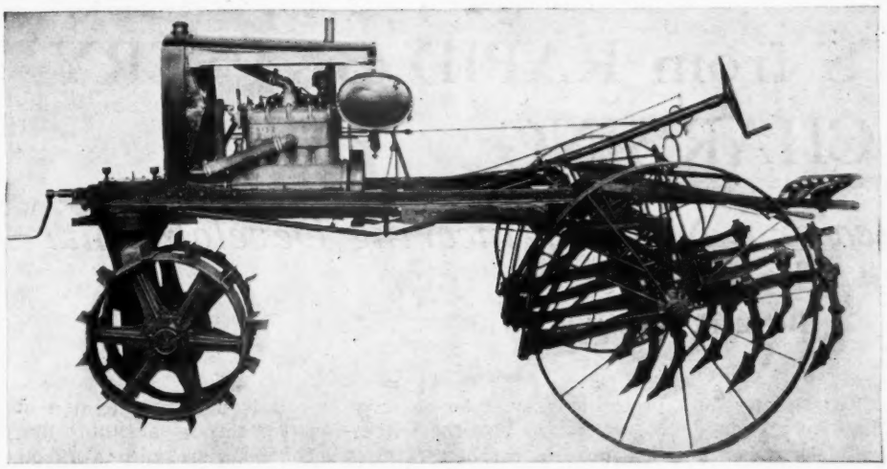
WITH the tractor industry turning its attention to the development of an automotive unit which will cultivate rowed crops and do other farm work, the cultivator recently brought out by the Boring Tractor Corp., Rockford, Ill. merits attention for the simplicity and uniqueness of its design and construction.

It is a power unit weighing only 1,200

Some Comforts of Home on Tour

THE Dumas Folding Auto Home is a special camping or outing body for motor truck or passenger car chassis. The equipment consists of two beds, 4 by 6 ft.; a sink 12 by 14 in.; 40 gal. tank; clothes lockers; cook stove with oven; electric lights; ice box and cabinets for dishes and other supplies necessary to accommodate four persons comfortably when touring. When the body sides are up, the dimensions are 6 by 12 ft. There is a door at each end and steps for easy access. When the sides are down the "house" measures 12 ft. square. The sides, which fold out, are operated by a crank system, and have legs that extend 15 in., if necessary, to adjust them to irregular ground.

The body, equipped, with the exception of linen and china, sells for $700. The picture show the traveling home mounted on a Reo Speed Wagon chassis. Dumas Folding Auto Home Co., Los Angeles.



New cultivating tractor developed by the Boring Tractor Corp. It will list at $395

lbs. and cast iron wheels are to be used instead of those shown in the illustration in order to bring the weight up to this amount.

The frame is angle iron; the transmission housing and the wheels cast iron. Power is generated by a 4-cyl. Leroi engine, 3⅛ x 4½, which, complete with carbureter and ignition equipment, weighs 350 lbs. Perfex radiator, Borg and Beck dry disk clutch, Zenith carbureter, United air cleaner and high tension magneto are used as standard equipment. The wheels are 30 in. in diameter, with 8 in. face.

This power unit was designed to be used with the implements now on the farm. In some cases, such as the cultivator shown in the illustration, the attachment can be made direct to the angle iron frame. In other cases a truck is attached to the rear of the tractor and implement connections made by means of a draw bar. It is claimed that this tractor furnishes sufficient power to operate a two-row cultivator, mower, binder, in fact any load which can be pulled by three horses. It has not been tried ahead of the plow, but it is claimed that it has sufficient power and weight to pull one 14 in. bottom. It is intended to supplement the 4-wheeled tractor on the larger farms, and there is hope that it will find a place on the smaller farms.

Aside from the general features of the design which involves two wheels so placed that they will run between two rows of corn, the use of implements now on the farms, and the simplicity of the design, the most interesting feature is the transmission. This consists of a bevel gear 2.95 to 1, and in the worm gear 20 to 1, giving a reduction from the engine to the axle of 59 to 1.

Variation in the rate of travel is obtained by a manually operated throttle control on the engine. The rated speeds are from ¼ to 4 miles per hour. To obtain this variation with the reduction used it is necessary for the engine to vary from 175 to 2700 r. p. m. Provision is being made to attach a belt pulley to the engine crankshaft on the front of the machine.

Varley Transformer Coils for Ford Cars Give Hotter Spark

RICHARD VARLEY has designed a high tension ignition system employing four transformers of special design that utilize current from the Ford flywheel magneto, and claims that there is great improvement in the running of Ford engines using his new system.

The principle of Varley's transformer is best explained by reference to the diagram, from which it will be seen that the flux has two paths, one through the leg containing the secondary winding; the other through the horns, air gap and armature. Under the secondary there is another winding called a "choke" coil which, when its circuit is closed and the primary energized, restrains the flow of flux through the secondary and forces some of it through the armature; then at a suitable point in the cycle, the magnetization of the horns overcoming the tension of the armature spring, separates the contacts, thus opening the choke coil circuit.

The resultant effect of increased flux density through the secondary coil, due in part to the fact that a large portion of the flux that previously took the upper path now passes through the secondary, accompanied by a high rate of change, sets up a voltage sufficient to jump the gap and deliver a current of high amperage, by reason of the small number of turns in the secondary.

Without the choke coil, the voltage in the secondary would have the very low value determined by the turns, as in a simple two-coil transformer. To obtain a pressure of about 6,000 volts, usually employed in ignition work, the secondary winding would require a very fine wire, the high resistance and excessively large number of turns of which would reduce the current to an amount too small to be of any practical use for the purpose of ignition.

It is said that the sparks obtained by the use of this new transformer have heat values greatly in excess of anything heretofore obtained from any coil using current from the same source.

The inventor has aimed to minimize ignition troubles common in coils of the Ruhmkorff type and has given particular attention to improvement in the trembler contacts in order to give greater reliability to the ignition system.

One of the troubles claimed to have been overcome is that of the burning and pitting of the contacts, which, although constantly going on in consequence of the main current from the generator being interrupted at the vibrator points, becomes very serious when the plugs get fouled by carbon or by reason of a cracked stone or porcelain. When a plug gets shorted, there is much flashing at the contacts of a Ruhmkorff coil, but Varley claims there is no sparking whatever across the contacts of his new transformer when the plug is shorted, and no current direct from the generator passes through the contacts at any time.

Only induced current passes through the contacts and this is so very small that pitting or burning is inappreciable.

For the installation of the new system on Ford cars, advantage is taken of their present wiring, and to further simplify the application, the Varley transformers are made to the dimensions of regular Ford units.

These Varley transformers, for use with the flywheel magneto on Ford cars, trucks and tractors, will be manufactured under a license agreement with the Varley Duplex Magneto Co. and will be distributed by the sales department of the Autocoil Co.

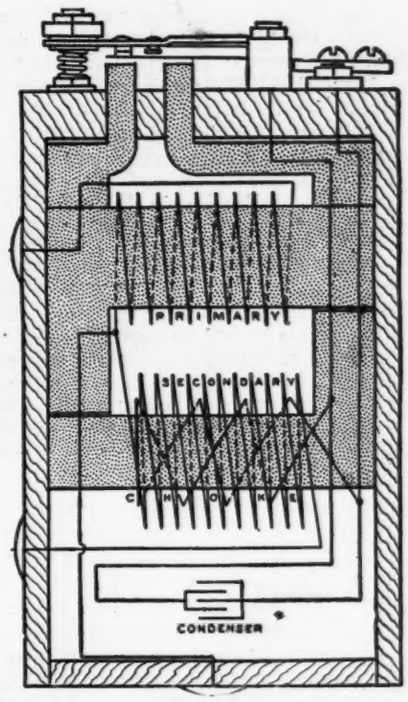


Diagram of Varley transformer coil unit for Ford cars

SHOP PROFITS from RAPID BATTERY CHARGING

Is It an Intangible Idea or a New Engineering Development?

By A. H. PACKER

THE question of the best way to charge batteries is one on which much can be said, the points brought up varying with the conditions assumed, for example, it being recognized that a badly sulphated battery may require treatment different from that given to a battery that has been recently discharged but which has not been allowed to remain that way for any length of time.

Taking the case of a 6 volt battery commonly rated as an 80 ampere hour battery, meaning perhaps that it is capable of giving out 5 amperes for 16 hours before the voltage per cell drops to 1.8 volts. This battery, when nearly new, and after it has been charged and discharged several times, will require perhaps 100 ampere hours to charge it while on discharge it gives out but 80 ampere hours. Under these circumstances we would say that the efficiency is 80 per cent, in which estimate of efficiency we are neglecting the voltage on charge and discharge.

Cost of Slow Charging

From the standpoint of the shop charging such batteries, it would be necessary to have it on the line 20 hours at a 5 ampere rate, which is the charging condition commonly employed with rectifiers. This length of time, that the car owner is deprived of his battery generally means that a rental battery must be supplied, for which a charge of 25 cents a day is usually made. With rapid service this would apparently mean that the customer would pay about 7[illegible] cents for having his battery charged and 25 cents for the use of the rental battery, or $1 in all for the job.

The conditions we have assumed however are that the battery is in the best of condition and takes the charge rapidly, but in nine cases out of ten this is not the case, for the battery is usually badly sulphated and the time required is more likely to be 72 hours instead of 20. This means that the customer pays for three days rental and his total bill comes to $1.50 under average conditions.

Profits in Rapid Charging

Suppose for a moment that we could charge batteries in a few hours instead of in 72 hours, say handling 2 batteries a day instead of one in three days. This would make it possible to handle six times the work in the same size shop, and the profits would be increased due to the rapid turnover. Then let us further assume that in many cases the job could be finished over night, so that if the car were not going to be used that night, a rental battery would not be needed. What about the saving in rental battery investment, if the business could be run with half the number customarily used?

Then how about the customer's standpoint? Would he be disappointed or pleased to get his work done over night instead of waiting three days for it? And would he not rather pay $1.50 for a charging job done quickly than 75 cents for one done slowly, if with the slow method he had to give up the other 75 cents anyway for the use of a rental battery.

Now let us sum up the possibilities; six times the amount of work handled in a given time and double the price received for it, accompanied by reduction in rental battery investment. Surely it is worth investigating, and further on in this article we will try to show what the possibilities really are, and what precautions must be observed, for it is not the intention of MOTOR AGE to give the impression that this is something like the proverbial rabbit farm, where you start with a rabbit or two, and from then on, merely collect the profits.

Constant Potential Method of Charging

The constant potential method of charging is the first approach to the ideal conditions that we wish to attain, for it means that we maintain a steady voltage at the generator, which will be about 8 volts, and connect our batteries to this and let them take as much current as their internal condition permits until charged. As this method depends on the fact that the battery voltage rises as it becomes charged, we will refer to Fig. 1 where the condition of the battery is shown

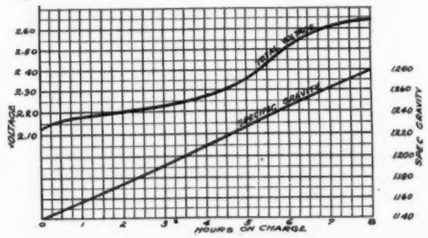


Fig. 1—Rise of Battery Voltage and Gravity While Being Charged

by curves. The voltage curve indicates that we start at about 2.12 volts and experience a slight rise at first. Then the rise is slow for a while, later increasing more rapidly until at the end of the charging operation the voltage is up to about 2.65 per cell, which in a six volt battery would mean that the voltage across the whole battery is 7.95 or approximately 8 volts.

We will now figure the current that would flow at any particular time if the voltage of the charging outfit should be kept at 8.3 while the battery voltage was changing. In the following table we have first the time in hours as shown along the bottom of the curves in Fig. 1. In column two we have the voltage of one cell at the different time intervals, these values being taken from the height of the voltage curve in Fig. 1. The third column is three times the second, being the voltage of the whole battery at different times. The fourth column gives the generator voltage which we assume is constant.

Here we come to a fundamental fact in charging batteries, that the current is equal to the voltage divided by the circuit resistance. In the case of battery charging however we have the generator voltage trying to force current in one direction around the circuit, while the battery is trying to discharge or send current in the other direction. The net result is that only the difference or excess of the generator voltage over that of the battery is really operative in sending current through the circuit. Column five is therefore given to show the value of this difference in voltage and these figures are obtained by

substracting the whole battery voltage at any time from 8.3 volts.

CHARGING CURRENT VALUES WITH CONSTANT POTENTIAL GENERATOR

Time in Hours	Volts per Cell	Total Bat. Volts	Generator Volts	Voltage Difference	Ohms	Amperes Charge
0	2.13	6.4	8.3	1.9	.1	19
1	2.18	6.55	8.3	1.75	.1	17.5
2	2.20	6.6	8.3	1.7	.1	17
3	2.22	6.65	8.3	1.65	.1	16.5
4	2.27	6.8	8.3	1.5	.1	15
5	2.35	7.05	8.3	1.25	.1	12.5
6	2.51	7.53	8.3	.77	.1	7.7
7	2.61	7.82	8.3	.48	.1	4.8
8	2.65	7.95	8.3	.35	.1	3.5

We will now assume that the resistance of the wire, clips, corroded contacts and internal battery resistance all adds up to .1 volts, so that to get the current at any time we divide the values in the fifth column by .1.

This gives the current values shown in the column at the extreme right and in Fig. 2 we have shown these ampere values

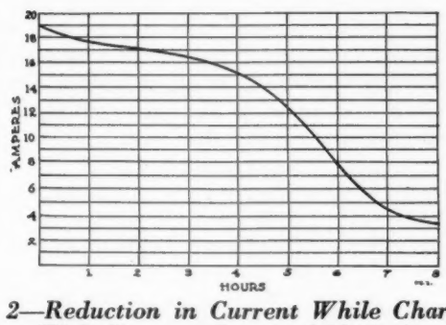


Fig. 2—Reduction in Current While Charging With Constant Potential Method

plotted against time, showing how the charging current naturally drops off as time goes on and the battery becomes charged. In this figure the unit spaces under the curve will represent ampere hours, and if these are counted it will be found that there are about 102 ampere hours, indicating that the battery would under favorable conditions have been fully charged in this time. Now assume that instead of being charged as indicated, that a constant charging current of 5 amperes had been used. For the same period of 8 hours we would have had but 40 ampere hours instead of 102 so that with the constant potential method we have divided the required time by about 2½.

What Causes the Heat in Charging?

Did you ever connect an electric flatiron or toaster to its socket and wonder whether the current was really flowing or not? This is a direct illustration that the current does NOT immediately heat up the electrical device. A very important factor has been omitted, and that is the TIME that this current is allowed to flow. In the same way we know it is out of the question to put a frying pan on the stove and immediately put the beefsteak on, and have it fry properly. Time is required before the mass of metal in the pan will be heated to the proper point, just as in the flat iron time is required to heat up the mass of metal.

In similar manner, it is not the current that overheats the battery, but current combined with the time it is allowed to flow, and as there is a considerable mass of metal in the battery, it is obvious that it will absorb a large amount of heat before its temperature rises to a dangerous point. The slow charging rates generally used are then based on the fact that heat is slowly radiated from any body to air at a lower temperature and if the heat is generated slowly enough, the radiation may be sufficient to dissipate the heat as fast as it is produced. In this case, the battery temperature may rise to 100 degrees and at this point radiate enough heat so that there is no further temperature rise. This is the general basis for the limit usually placed on permissible charging rates. Radically different from this method however is the one we will consider, in which a very heavy current is used, ranging from 100 to 250 amperes, but used for a comparatively short time, so that the mass of metal in the battery absorbs the heat generated, and the charge is discontinued or the rate reduced when the permissible high temperature is reached.

The Sulphated Battery

The natural action of a battery when discharging produces lead sulphate but when this sulphate is allowed to stand it gradually changes into a different sulphate of white crystalline form, which is very difficult to change back into spongy lead and lead oxide, of which the negative and positive plates are composed. A sulphated battery is therefore usually considered to be one that has been left in a discharged condition for a long time and the white condition of the plates may be seen in the appearance of the active material, which condition permeates this active material, or it may show up as white crystals on the outside of the plates which prevents the current finding its way into the plates on account of the insulating character of this sulphate.

It therefore happens that batteries are often found to be in such a condition that they are usually considered incurable, as the charging current required to reform them will not flow. There is not much question but what this crystalline sulphate must be either removed or transformed, or the battery may be considered junk, so that if this material can be removed, even at the expense of slightly reducing the amount of active material on the plates, it is evident that the battery will attain a new period of usefulness.

Blasting Off the Sulphate

While contrary to recognized practice, the following test will nevertheless point out possibilities that may revolutionize battery charging practice. The possibility of a 200 ampere charge rate had been brought to the attention of the writer, and it was accordingly in a somewhat skeptical state of mind that he witnessed the following test.

The battery in question was a six volt one having 13 plates per cell and had been brought in to be rebuilt, as other battery shops could do nothing with it. Observation showed that it was bone dry and a voltmeter indicated .2 volts on each cell. Water was used to fill the cells, supplemented with a hydrometer full of 1,400 acid in each cell to give some conductivity and start the current flowing. It was then connected to a low voltage generator capable of giving out 250 amperes or more, and the charge was started and regulated to about 150 amperes.

The first effect was a violent boiling action accompanied by muddy appearing bubbles, which caused the liquid in the battery to overflow. The battery man now used a syringe to draw off this excess liquid and while the bubbling action continued, it did so with less violence as time went on. The writer then requested that the temperature of the battery be checked, which was done with a battery thermometer, but the battery was so cool that the temperature could not be seen until some ten or fifteen minutes later, when the battery man by feeling the terminals decided that the charge had been continued long enough. At the same time the writer took the temperature reading and found it to be 110 degrees, showing that the battery man's experience had enabled him to tell when the critical point had been reached.

What the "Junk" Battery Was Able to Do

After the ten or fifteen minutes charge just described had been completed, the question arose as to how much good had been done, so a high rate discharge test was arranged, by using a 500 ampere meter and carbon plate rheostat. The following test was then made.

Time	Volts	Amps
2.50 P. M.	5.1	240
2.52 P. M.	5.	230
2.54 P. M.	5.	212
2.56 P. M.	4.3	170

As the average starter current is not over 150 amperes the performance of this battery was such that it would have

cranked the engine for at least six minutes, and as the average engine will start in a few seconds, if properly choked, it is evident that the user could have started off on a trip if such a course had been absolutely necessary.

The process recommended is not quite as quick as this, however, for the next step was to dump out the electrolyte, which carried with it a cloud of the white sulphate which had been blasted loose from the plates by the high charge rate. The battery was then refilled with distilled water and the high charge rate continued. This time however it was noticed that the violent bubbling action did not occur and that the heating took place after a much longer time due no doubt to the fact that the current was now producing the required chemical change in the plates, as it did not have so much of the high resistance sulphate to contend with. The battery man then informed the writer that the dumping process might be continued two or three times, and then as the high rate began to heat up the battery, it would be transferred to a rectifier charging line where the finishing touches would be given at a lower rate.

After the test on the 80 ampere hour six volt battery had been concluded, another test was run on half of a 12 volt Maxwell battery, this comprising three cells, each of which had 7 plates, while the first battery tested had 13 plates per cell.

This battery showed at first a reading of 3 volts across all three cells. Water was then added with some acid, and the generator was connected, although at first no current was visible on the meter, even with the generator voltage adjusted up to 14 volts. After a few moments, however, the resistance in the battery began to break down and the flow of current started. Careful readings were now taken of the time, amperes and volts, these being as follows:

Time	Amps	Volts
3.8 P. M.	20	14
3.9 P. M.	32	13.5
3.10 P. M.	41	13.
3.11 P. M.	52	12.5
3.12 P. M.	63	12
3.15 P. M.	92	11
3.21 P. M.	130	9
3.22 P. M.	50	8.3

The gradual rise in current from 20 to 92 was due to reduction in internal resistance as the charge progressed. The sudden rise to 130 amps. however was due to manipulation of the generator voltage control to see what would happen. Nothing unusual was observed. The drop to 50 amps. was also due to rheostat adjustment in the generator field.

What Is It Worth?

After this charge had been discontinued no discharge run was made, but the plates were pulled out of one cell and inspected, having been also inspected before the process was started. There appeared to be no detrimental action. The separators were in good condition, white, and not the least bit charred, and the plates were firm, and some of the white crystalline sulphate had come off and the rest was quite loose, so that it appeared as if further treatment and washing out might result in removing it all.

The commercial value of any improved method of doing anything depends on whether it is possible to make more money with it than without it, the initial investment and all other items considered. What then would be the value of this process to the customer, assuming he has a battery which would cost say $25 to replace or $15 to rebuild but by the drastic action just described can be given a new lease on life and may give six months or more of service. Surely this service is worth more than the customary price for charging, its exact value being something that each individual shop will determine to suit local conditions.

Thanks

In conclusion MOTOR AGE wishes to acknowledge the valuable cooperation received from R. R. Haugh who originally presented the idea, to Frank Duffy of the Duffy Battery Station, who has conducted the research on this method of charging, to the Great Lakes Electric Co., where the 110 volt generator was rewound for 8 volt service and to the Vesta Battery Corp. from which valuable points of information were obtained.

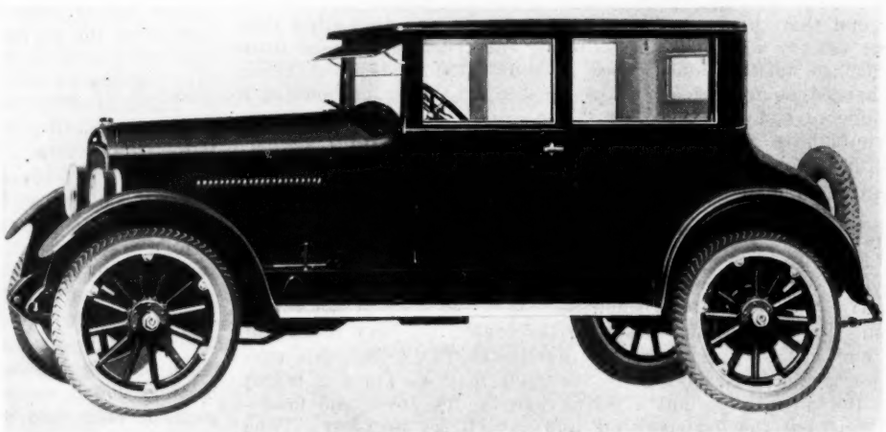
China—Motor Car Census; Usable Roads

There are 6,866 passenger cars, 437 trucks, and 792 motorcycles in the various cities of China, according to a conservative estimate based on the most reliable figures available. It is difficult to ascertain what percentage of the cars are of American make, but the fact that the United States furnished 47 per cent of the motor vehicles imported in 1918 (641,346 Haikwan taels worth), 59 per cent of those imported in 1919 (1,404,388 taels worth), and 57 per cent of the imports in 1920 (amounting to 2,191,644 taels) may serve, as the basis of an estimate.

The census of roads in China credits the country with 2,050 miles that are unsurfaced but good for motors, 2,000 miles of motor roads under construction since 1920, and 8,000 miles in projection since 1920.

South Africa—Light Cars the Most Serviceable

It is estimated that there are about 21,214 passenger cars, 952 trucks, and 11,630 motorcycles in all South Africa. A majority of the passenger cars are found in the towns, Johannesburg alone having over 3,000. Light-weight cars are the most serviceable to farmers and others living in the rural districts, because of bad roads outside of the urban centers. About 55 per cent of the cars in South Africa are made in the United States, and an additional 30 per cent are United States manufacturers' cars made in their Canadian factories.



Coupe is Latest Jewett Model

THE coupe is a new Jewett model to go into production during July. It is a four-passenger car of standard closed body construction using all-metal panels over a wood frame. The body is 77 in. in length by 57 in. in width. The auxiliary seat for the fourth passenger faces forward and is equipped with back and arm rests. The Jewett coupe is equipped with cowl ventilator, sun visor, dome light, locks on doors and lever window lifts. The price mounted on the six-cylinder chassis is $1395.

A *Successful Dealer* Who Has Never Sold *a New* Car

Intelligent Merchandising of Used Cars, Made as Good as New, Proves Profitable in Central Illinois Town

IT is particularly surprising to hear of men who have built a going business on the sale of used cars, after hearing so often the tales of woe and losses from the new car dealers who see in the used car only a source of trouble. These men who have made good on the used cars have done so by merely applying to this much despised article of merchandise the regular practices of merchandising.

B. B. Burns, president of the Illinois Automotive Trades Dealers' Association is one of these who finds a profit in used cars. Burns has never sold new cars. He has been in the used car business for several years, long enough to know the value of repeat sales. His place of business is in Decatur, Ill., a community larger in population than the average community in the country. He has in this town something of the metropolitan social conditions but more of the small community. He must meet these conditions in his merchandising. He has some of the "trader" custom, as well as the class of trade that buys for social conditions only. He has developed both classes to the replacement stage.

A Supply of Used Cars

Burns has several methods of obtaining his cars. He serves several new car dealers as an appraiser. He has no condition on this appraisal work of requiring the dealer to let him have this car. When he puts the price on the car he does not know that it is coming to his establishment. If the dealer thinks that at the price, he can turn this car at a profit, that is his privilege. If he wants to send it to Burns at the appraisal price, all well and good.

The main thing in this feature of the work is that Burns believes there is a point where the car becomes junk and when it is junk, it carries only junk price. He does not try to do the impossible.

It happens that the Decatur community does not produce sufficient used cars to meet the demand. Burns does not believe that in the entire country there are enough used cars to meet the demands if they are properly merchandised. So Burns is always on the alert as a buyer of used cars. One of his chief sources of supply is the settlement of estates. Most administrators do not care to peddle their wares. They much prefer a bid from some legitimate buyer whose communications look business-like to the court which must pass on the transactions.

B. B. BURNS

Contact With Other Markets

Also, Burns keeps in close touch with the used car markets in Chicago and St. Louis, as well as some of the smaller cities. His appearance as a cash buyer is welcomed in these cities when the market is dull, especially as he is interested in the better class of cars and so many new car dealers do not know how to price a used car up to its value as well as to price a poor car down to its proper level.

In buying a car, Burns always estimates what his shop can do to this car. The car that he sees is not the one before him, but this same car properly painted, upholstery and top properly overhauled and the engine and chassis in good condition. Squeaks, of course, are taken out. The car that he will offer to his customer is to all intents and purposes a new car. It is the foundation for this work that he buys.

Practically all of this work is done in his own shop. The paint shop, in Burns' mind, is an extremely important part of the establishment. His output of sport models will compare favorably with the output of some factories that have built up a reputation for this class of car. A very bedraggled looking roadster comes out of his shop as a very smart looking sport car. Equipment, the brighter, showy sort, can be sold at list price when put on such a car, and the sale of $200 worth of equipment is not to be despised.

Renewed Mechanically

Before undertaking this work, Burns was in charge of the automotive equipment for some large companies and while he is not a mechanic, he knows very well what a mechanic can do for a car. Also he is able to judge when this work is well done. His shop has ample facilities for all ordinary work and he confines his shop to his own work.

The soft cylinder blocks of the war time period are regarded by Burns as more or less of a special dispensation for the used car man. He likes to get hold of these cars, for usually the owner has been very much disgusted with the car and it is often in very good condition otherwise. The renewing of the cylinder blocks is sent to the specialists and after the piston fitting and other work has been carefully gone over in his own shop, Burns is able to put all his energy into play in selling this car, for it his firm belief that this car is going to the new owner as a better car than it was when it left the factory.

With the car carefully gone over by the mechanics, the body dents and squeaks removed, the social features properly attended to in the paint shop, selling becomes the important task.

A Car for Every Price Class

Burns keeps on his floor an adequate line of cars to fit the taste and pocketbook of the prospective buyer. None of these cars can be identified by outside appearance as to its former owner. Burns puts as much energy and perhaps more intelligence into the sale of these cars as any new car dealer. Each car is sufficiently tested to learn its individual points. It is sold on the reputation of the car generally, backed up by Burns' own reputation, and the particular points as to this special car are the special selling points.

Burns sums it all up briefly as "good merchandising." His belief is that there is room for many such merchants.

Investigation of Unethical Used Car Advertising Reveals Unfair Practices

False Listing of Used Cars of a Rival Make at a Price Calculated to Shed Discredit on It Frowned Upon by Kansas City Advertising Club—Suggestions for Correction Offered

Kansas City, Mo., July 3.

THE Advertisers' Protective Bureau of the Kansas City Advertising Club has, responsive to a complaint, presumably from a customer, made an investigation of a specific case of used car advertising. This inquiry was further made the basis of a report on used car advertising in general, which displayed some of the alleged improper practices indulged in to move cars, and to attract customers.

One of the phases of the report, however, goes in the direction of suggestion for correction of improper competitive advertising namely, the advertising of used cars of a competitor's make, at low prices, for the purpose of discrediting that competitive car in the minds of the public. The latter motive in advertising may not, perhaps, subject the advertiser to action under state "honest advertising laws," but when the motive is put into effect by advertising of prices which he will not grant, the used car dealer becomes then, it is said, subject to the provisions of the laws in some states. The Kansas City bureau is not planning any prosecutions, however, so far as known; but it is instigating steps that may lead to the establishment and observance of standards in advertising of used cars, and the education of dealers to the benefit of fair and square practices for the building of really substantial and profitable business. The report in part follows:

Special Bulletin Used Automobile Advertising

Recent investigation of a used car advertisement listing nine cars of a single make not handled by the advertiser, which had been "taken in" on the advertiser's new cars, has disclosed the following harmful advertising practices;

1. Use of advertising to slight competitor's cars.
2. Prices quoted prospective customers do not agree with those quoted in the advertisement.
3. Cars advertised found not actually in possession of advertiser, so that delivery could not be made.
4. Statements made by salesman and officials of firm do not agree.

Our investigator interviewed a salesman in the used car department, the manager of that department and the general manager of the firm, in the endeavor to view the nine used cars of another make "taken in."

The salesman showed our investigator a five passenger car and a coupe, stated that one five passenger touring car was out on demonstration, another in the repair shops, and that the other five cars advertised had been sold out since the advertisement first appeared two days before.

The general manager later stated that no used cars of the kind advertised had been sold since the advertisement appeared and gave descriptions and engine numbers for seven of the nine cars advertised. He then showed six of these to our investigator—four five passenger touring cars, one coupe, and one roadster. Another of the five passenger touring cars was stated to be in a city several hundred miles from Kansas City where it had been traded in on a new car. Still another of the cars advertised was said to be one which the firm was trying to sell for a prospective customer but did not yet have possession of, or title to. The ninth car was not accounted for.

The prices quoted for the cars shown did not agree with those given in the advertisement, but varied considerably.

The general manager stated the main purpose of their advertisement was to show the public and their competitor how many of the competitor's cars had been taken in on their own new cars, while the manager of the used car department stated the firm never advertised used cars unless they were actually on hand or definite arrangements had been made to get them.

The general manager further stated the advertisement did not say these cars were on hand and for sale, but simply that they had been taken in on new cars. He said that he was not sure whether the particular cars referred to in the advertisement could be pointed out since they had more than nine cars of this particular make on hand most of the time.

According to these two officials, it is a practice among motor car dealers of advertising used cars belonging to prospective customers in the hope that the offer to sell the customer's present car at a good price will induce him to buy a new one they handle.

Another selling practice brought out in this investigation is that of advertising used cars which the company may have title, to but which are not in Kansas City ready for delivery. In both cases, unless the conditions are made entirely clear, such advertising is deceptive because it leads the reader to believe that he can have immediate delivery.

The Bureau believes this is a very questionable practice since it can hardly be expected that a purchaser would buy a used car without having seen it.

The main purpose of many used car advertisements, according to statements made to our investigator, seems to be to "show up" the car handled by a competitor by citing how many of the competitor's cars have been traded in "at a sacrifice" on the purchase of a new car of a different brand, rather than to sell, in a straightforward and legitimate way, the used cars which the dealer himself may have.

The Bureau believes it is a misuse of advertising to employ copy for other than sales or educational purposes, and especially to use it for the purpose of knocking a competitor, either directly or indirectly. Such use of advertising does not inspire confidence, but rather breeds distrust and unbelief, which reacts against all automobile advertising.

Much progress toward the elimination of incorrect advertising and sales practices in various fields of business, including the automobile field, has been made within the last few years. In some lines of trade, the evils of misleading terms have been largely decreased by the adoption of standards for advertising terms.

A similar set of standards to govern automobile advertising would be a great boom in making such advertising more effective.

Greece—American Cars Predominate

Sixty-five per cent of the 2,500 passenger cars in Greece are of American make, the remainder being principally French, Italian, German, and British. Of the above, 2,000 are in the Athens-Piraeus district. In addition, there are 400 trucks and 200 busses in use at the present time, 60 per cent of which are of American make; the remainder are principally Italian, British, and French. About 60 per cent of the trucks and busses in use were secured from war material at Saloniki.

Spain—Few Trailers; License-Plate Market

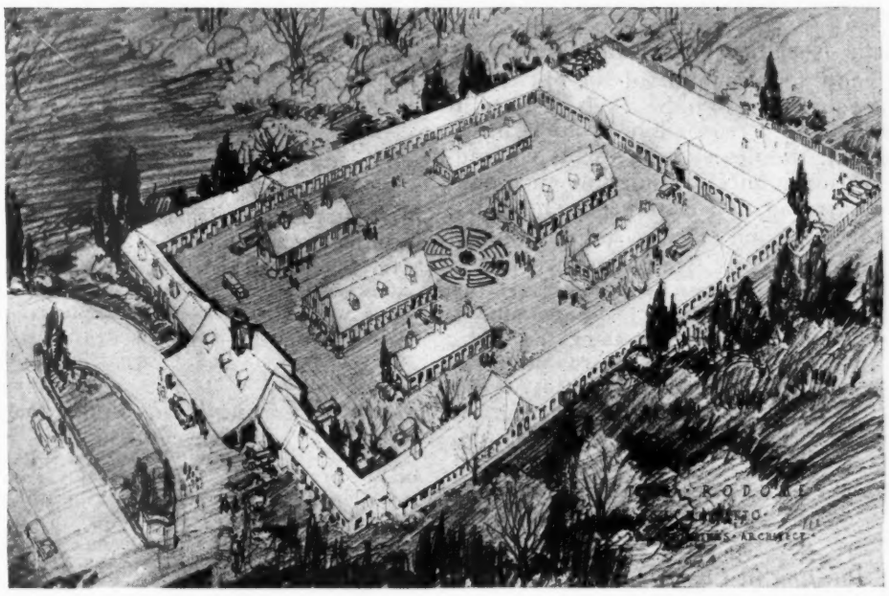
There are very few trailers in use in Spain, on account of the narrow streets in cities; and the scarcity of trucks outside of cities limits their use on the country roads.

License plates are not issued by the Government in Spain, but are secured from automobile accessory dealers, tinshops, and blacksmiths, after being assigned by Government officials.

Tourist Hotel Project Includes Maintenance and Accessory Sales

Contemplated Chain of Modernized Motor Taverns Throughout West to Attract Tourist Trade by Grouping All Needs of Man and Machine

THE automotive dealer has been inclined to ignore the tourist. Apparently there has been a feeling that the tourist was a nuisance and so his patronage has, to a very large extent, been ignored by the regular channels of trade, except in the case of the gas station. Few of the merchants featuring accessories and maintenance have bid for the tourist trade, even to the extent of stocking tourist supplies. Now a competitor has arisen for this trade in the Pacific Coast region, where the tourist is the most numerous. This new competitor is not only seeking the patronage that should go to the automotive merchant but he is striking at the hotels, which have largely taken the tourist as a matter of course and appeared to be content with installing a small motor club office and putting a tiny sign near the door.



Sketch of new "Rodome" motor tourist tavern. 18 of which will be erected in the leading cities of Oregon, Washington and California. Sacramento will be the location of the first Rodome, which will be erected at once; Portland will secure the second. All are expected to be in operation by late fall. Everything the motor traveler needs will be sold

The interesting story of the new form of motorist hotel, supply store and maintenance station comes from Portland, Ore.

The Rodome, a modernized motor tavern resembling in some features the high class hotel and in other features the automobile camp ground, is to make its appearance on the Pacific coast as a new industry, to help care for the growing thousands of motorists who tour in this region every season and to a considerable extent all the year around. This was made known this week when plans for erecting the first Rodome at Sacramento, Cal., were completed. One of the Rodomes will be erected soon after in Portland, and then in rapid succession the motor taverns will be put up in the following cities, it is stated: Vancouver, B. C., Seattle, Ellensburg and Spokane, Wash., Hood River, Pendleton, Eugene, Medford, Oregon; Redding, Oakland, Monterey, San Luis Obispo, Santa Barbara, Los Angeles, San Diego, Bakersfield and Merced, California; and Reno, Nevada.

Spokane, Portland and California capital is backing the enterprize.

Each Rodome will follow the same general plan. Each will cover approximately four acres of ground. A building in the form of a square will be erected completely around this plot, leaving the center open, and with an entrance provided. The architecture will be one story bungalow type, divided into apartments with garages adjoining, all opening off the central paved court. Thus the motorist driving in will be able to secure his apartment, for as many as are in his party, with or without bath, and will drive his car into the garage which directly adjoins his rooms. A key to both will be provided. In each apartment will be a small kitchenette, with sufficient cooking utensils to allow the motor party to prepare their meals if they desire.

At the center of the open court will be a building housing a general store, a delicatessen store, motor equipment and accessory store and shops, while located at convenient points on the grounds will be washing racks and repair stations where the motorists who desire to can work on their cars. Each Rodome will accommodate approximately 420 persons and 90 cars.

The cities chosen for Rodome locations are 100 to 200 miles apart, each within one-day driving of another, so that the motorist who desires to can utilize the system in his tour of the entire Pacific coast. Rates and service will be identical, it is announced, at all the Rodomes and a patron will be able to make reservations at one stopping place for his accommodations at the next stopping point, thus insuring his getting cared for.

Motor camping is becoming unusually popular in the west and motorists by the thousands from the east and middle west, as well as the far westerners themselves, are now filling the roads with their cars loaded down with camping equipment. While nearly every city now has its public automobile camp, many motor campers would prefer something a trifle better and would favor an arrangement whereby they could do away with a considerable portion of their camping paraphernalia, it is believed, and it is largely to fill this demand that the Rodome plan has been evolved.

CIGARS STORES SELL TUBES

NEW YORK, July 3—The United Cigar Stores Co. has gone into the tire business, specializing in red inner tubes. In the windows of several of the New York City shops are displayed an assortment of these tubes which, the cards accompanying announce, are made specially for the United States Cigar Stores Co. by the Dixon Rubber Co.

What *the* Tractor Dealer *Should* Know About Power Farming

Chiefly, He Should Know His Own Community, the Problems Peculiar to the Farms in That Community and Then How the Tractor Will Fit In to Carry the Peak Load

By E. A. WHITE

THE dealer who is selling power farming equipment cannot know too much about the operations for which this equipment is to be used. The right to make a good living and a reasonable profit is based upon the service which the dealer renders his community. When used in this connection, maintenance does not mean only the carrying of repair parts and being equipped to render prompt and efficient aid in times of trouble at a reasonable price, but also an effective meeting of the needs of the community for power farming equipment.

When reduced to fundamentals, the only thing the dealer has to sell is service. It is true that society regards the dealer as a seller of certain equipment, but this, in reality, is the medium through which service is rendered. Whether the dealer gets a good living and the profit to which he is entitled if he renders a constructive service, depends upon a number of factors, including organizing and managing ability, financial methods, sales program and many other factors which are well known to the trade.

Dealers' Position in Community

None of these factors can be neglected without imperiling the business, but back of all should be a thorough appreciation of the fact that the dealer's position in the community depends primarily upon his ability to render service. This makes the dealer an integral part of the operating plan of any community. His place becomes just as clearly recognized as that of the banker, preacher or physician. He is one of the group rendering the service necessary for the community to function properly. Such an interpretation of the dealer's place in the community establishes him as of far more importance than a mere seller of goods. He becomes an institution and receives recognition accordingly.

Applying this fundamental principle to the sale of tractors and other power farming equipment does not require even a slight stretch of the imagination to discern that the successful power farming dealer will be thoroughly familiar with agricultural conditions in his community and have a detailed knowledge of various farm operations, especially as related to their power requirements. Farming is a business and the farmer buys equipment much on the same basis as the factory manager buys equipment for his factory. It is looked upon as an investment which must bring returns in one form or another.

To get this viewpoint, just imagine a man walking into your office for the purpose of selling you some new office or shop equipment. You will want to know how it is adapted to your business and what the advantages of its use are. In other words, you will demand to be shown in a manner which is convincing to you, just why you should buy.

Will It Make Money for the Farmer?

No matter how logical the arguments of the salesman may be, you as a prospective customer must be convinced, and in the last analysis the proposition will be decided upon whether you believe the investment will prove a paying proposition in your business.

After this has been decided, there is the question of financing the purchase. But never forget that before the question of finances comes up, the prospective customer must have reached the mental stage where he has the desire to invest.

Now there are many reasons which govern the purchase of a tractor and some will have weight with one customer and some with another. No matter what individual appeal may be used on various occasions, the background for the sale of power farming equipment is the advantages which it is going to bring to agriculture. The returns must be commensurate with the investment. In order to discuss these advantages intelligently, it is essential that the dealer or his salesman know just as much about agricultural practices as the farmer and, if possible, more about the use of mechanical power generators.

Farmer Wants Results on His Farm

The tractor and other power farming equipment are used in the production of agricultural products, and these operations must be conducted at a profit to the farmer, or else American agriculture is going to decline, and this is not going to happen. As is the case with any business man, the farmer is interested in making money. He does not consider his farm an experimental laboratory, but a going concern, therefore he wants to be convinced regarding the value of equipment before he buys it. Under these conditions it is evident that a successful salesman must be informed regarding the agricultural practices of his community and have this information in usable form.

The first step in getting intelligently acquainted with the agricultural practices of the community is to size up the different types of farming. There are few dealers' territories indeed which do not have more than one type of farming. It is true that one type often predominates, but in addition to this, there may be from one to a half-dozen other types practiced.

The dairyman's problems are somewhat different than those of the grain farmer, and a man who makes a business of growing hogs for the market has still another set of problems. What would appeal to one of these men might not interest the other two, for each wants to know just how the equipment can be used on his farm at a profit. Once the types of farming are thoroughly fixed in mind, the next problem is to become familiar with both good and bad farm practices, especially from the power standpoint.

Knowledge of Farm Sizes in Territory

Once the types of farms are thoroughly fixed in the mind, the next thing which may profitably be taken up is to learn something of the sizes of farms in the trading radius. Secure from the Bureau of Census, Washington, a copy of the agricultural census report for your state and see how the farms are divided according to size in your home county. This information is all tabulated and easy to understand. While you are looking at this report, glance over the value of the agricultural products of your county and learn something of its agricultural possibilities and potential purchasing power of the farmers. This will also tell you how many horses and the numbers of other classes of livestock on farms. This information is worth knowing because it gives a picture of the agriculture in your

community which is difficult if not impossible to get in any other way. Find out just what your home county is from an agricultural standpoint. There is a fund of information tucked away in these census reports, but it takes a little study to get it out.

There is a tendency on the part of many dealers to consider intensive sales study of this character as something nice to write about but of little value from the standpoint of actually getting business. Well, every man is entitled to his own opinion on a question of this character, or any other for that matter, but it is our observation that the companies and dealers who have been the most successful in moving tractors during the past two years have been most diligent in working out the detailed applications of the tractor to agriculture and have been taking pains in seeing that the salesmen are as familiar as possible with agricultural practices, and we know of tractor sales which have been lost because the salesman was not up on agricultural practices.

The farmer soon senses whether the salesman has come out to sell him a tractor or a power system for the farm. There are ample evidences that the tractor buyer of the next five years is going to be a much more discriminating customer than has been the case during the past five years, if for no other reason than that he has a lot of tractor observation and experience.

Farmers Discuss Tractors

You know farmers get together more than they used to and talk things over. The tractor has not been neglected in these informal discussions. If you wish to be convinced on this point, just compare the questions which farmers ask on tractors today with those asked five years ago. The situation is changing rapidly.

The dealer who meets the situation must change also, and one of the best ways to do it is to sell the tractor from the standpoint of the power requirements of the farmer. To do this means to learn all possible about agricultural practices.

With a knowledge of the types of farming and general agricultural characteristics of his region, the dealer is ready to delve further into the agricultural practices, with a view to rendering service to his customers.

Next it is in order to learn the relative acreages of the crops grown and the rotations followed in the different systems of farming. This is the backbone of farming, especially from the salesman's standpoint, for the tractor is used almost entirely in connection with the crops. It is first seedbed preparation, then planting, then cultivating, then harvest, and then preparing for feeding or market. Stop and think of it. There are few tractor operations, indeed, which do not have to do directly with the crops. So it would appear to be the part of wisdom to know just how the tractor can be used in connection with this work of crop production.

There are optimum times designated by nature for the performing of the various operations connected with crop production. Planting cannot be delayed beyond certain dates without imperiling the harvest, the cultivating season is limited, and harvesting must be done when crops are ripe for maximum results. These optimum times vary according to crop and locality, so each dealer has to work them out for his own conditions. It is not sufficient to merely know current practices in this regard.

Tractors Often Crop Insurance

The power farming dealer must know how the equipment which he is selling can be used to improve conditions. In other words, there are many times when the tractor is crop insurance and the savings of one crop may go a long ways towards paying for the outfit.

In practically every system of farming there is a peak load season for both power and man labor. Frequently these two peaks come together. As the tractor is a great peak load carrier, it is important to know when these peaks appear in various systems of farming and just how the tractor can be used to meet them. In such times it is especially important that the farmer be able to do a large amount of work in a short period of time and with the help regularly employed. This makes long hours and as fast a rate of work as possible desirable.

As the power farming dealer is engaged in selling a new power system to agriculture, and we are only in the beginning of this, it is essential to become familiar with the present power system as used in the various types of farming. The strong and weak points should be ferreted out with some attention paid to the costs involved. While there is certain to be more or less sentiment attached to a well-established system, the farmer is primarily interested in economic and efficient methods of doing his work, and when he is convinced of the advantages of a better system, sentiment will play a constantly diminishing part.

Two Power Systems in One

As animal motors, the horse and the mule are the chief power generators today their performance merits study. The dealer should learn just how far the equipment which is selling can replace the horse and what is the minimum number of animals necessary to retain when the tratcor is used in the various systems of farming. A little study will generally disclose some operation that is the limiting factor in determining the number of horses to be kept.

For example, if the tractor being sold cannot be used for cultivating corn, the number of horses required for this operation represents the minimum on many corn belt farms.

The tractor is a combination power generator adapted to both drawbar and belt work. The farmer has never had a machine of this character before, and full advantage should be taken of this fact. In order to do this it is necessary to know how much belt work the farmer has, how he is getting it done and home much it is costing him. This information in connection with a study of the strong and weak points of the present methods will furnish a splendid foundation for a campaign on the tractor and belt work. Belt work constitutes somewhere between 10 and 20 per cent of the total power requirements of the farm.

Before the introduction of the tractor is was necessary to maintain two power systems, one for belt work and the other for drawbar work, although as a rule the farmer did not own the generators for belt power. However, the farms had to carry the expense of this dual system and see it stand idle much of the year. There are interesting possibilities in this connection still to be realized.

A Source of Farming Information

The "know how" regarding the use of power farming equipment has a direct relation to its successful sale by the dealer. There is every reason why the dealer should strive to make his organization a source of constructive agricultural information.

In the first place, the more profitable the agriculture of the region, the more chance the dealer has to realize a desirable volume of business and make a profit. In the second place, the farmer, just as any other business man, is seriously up against the problem of reducing his expenses and making a profit.

In this connection it must be kept in mind that the farmer is not fundamentally different than other people and he naturally resents an outside party telling him how to run his business. Whether this attitude is justified is beside the mark. The condition exists and this is what the dealer must face. The approach then must be diplomatic, courteous and constructive. If you have something to offer the farmer and make the proper approach, he will find it out. Once a bit of constructive information is put across, the way is opened for more. It is salesmanship of the highest type.

The power farming dealer who does not know agricultural practices and ways and means of improving them through the use of the equipment which he is selling is neglecting one of his most important sales approaches. Never forget that power farming equipment is production equipment, and therefore must be sold on the basis of its advantages from a production standpoint. There are other appeals, to be certain, but this one is the basis.

MOTOR AGE

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WASHINGTON OFFICE
816 Fifteenth St., N. W.

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The Other Side

THE "Wobbly One," exhaling an atmosphere indicating too rich a mixture, approached a pedestrian, whose equilibrium was obviously more stable, and hazarded a question, "W'ere ish ze uzzer side of ze sthreet?" The "Stable One" eyed the other with contempt somewhat softened by curiosity and envy. "Over there, of course," he said, "where do you suppose it would be?" The "Wobbly One" made two futile drives at his hat with one hand before effecting its removal, then scratched his head slowly before replying, "S'funny sing; I's jus over dere, an a nuzzer feller says it's over here."

It is proverbial that the other side of the river always seems to have greener grass and to be more attractive, and in similar manner the business on the other side of the street may seem to have advantages that we seem unable to attain, yet what is possible to him is possible to us. A striking illustration of such a condition was seen in a small town where a locally well-known repair man ran a small battery shop. More accurately, the shop ran him—nearly to death, in fact, for with doing all the work, keeping the books, and making sales, he never had time to clean up the place nor put things in order. Batteries were here and batteries there, no racks were provided and the floor was a solid mass of batteries, old and new.

Customers came, as customers often will, because this man knew the battery work. Many stopped, however, waited a while in vain, and then when on their way, because, as we have said, the shop ran the man, and not being an electrical Marathon runner, he could not always keep up with the work as fast as it came to him.

This man was approached one day with the idea that he could increase his business, and profits, by employing a man skilled in general electrical work. Such work, it was pointed out, need not increase the fixed overhead charges, such as rent, light, heat and similar items. It was also pointed out that such a man, when not busy on this special work, could be used for the purpose of putting in order the large stock of batteries. But the only point the man could see was that so much per week would have to be paid out of his meagre earnings for the other man's salary. The fact that any good man could make two or three times his salary in increased number of jobs handled was a point brought out in vain, and, as far as we know, the battery man is still stumbling over his own batteries and grumbling about how much work he has to do and how little there is in it.

We hope that such conditions are becoming more rare, but is it not possible that a look at your shop from the outsider's standpoint might not show some place where a slight investment for equipment, or the employment of a man specially trained in some line might pay for themselves in a short time and increase your shop profits on the same overhead and general investment?

Did You Ever Notice?

A GREAT many pert observations can be made by the man who stands for any length of time on the city boulevard. The cars pass in seeming endless procession, there is the constant drone of non-skid tires, the occasional screaming of quickly applied brakes, and the loud clash of grating gears. Here comes a 1912 Peeres that time has dealt kindly with, the paint is a little dulled but the engine sounds sweet and solid as it passes the popular 1920 Oylkan which is struggling hard to keep from losing altitude. The Oylkan six is a good car but this one apparently has been neglected. The right rear wheel has a decided wobble, the engine sounds so good that a horn is unnecessary. A 1919 Gem passes by with a growl, the axle is noisy because of bad adjustment.

We wonder if any of the dealers on automobile row have ever stood in front of the handsome sales places and noticed the passing show?

Just of recent years some dealers have taken to canvassing from house to house in their efforts to sell cars. The dealers who used these methods are said to have established a precedent in the annals of car salesmanship. Many car sales have been attributed to the new methods of salesmanship wherein the salesman is required to get out and work.

We believe if the Oylkan and the Gem dealer or any other dealer would station himself on the main travelled street of his town for two hours or more that he would see scores of Gem and Oylkan cars in various stages of dilapidation. If the dealer would do this it is not unlikely, if he were a live dealer, that the next day he would have one of the members of his maintenance department stationed at a point of vantage on the main thoroughfare. The representative would record in his notebook the license number of every passing Oylkan or Gem car and opposite the license

number would be recorded the obvious parts of the car that required attention and service. From the license number the name and address of the owner could be secured and a personal call or letter should follow. The car may be in need of only slight adjustments, but the fact that the dealer has been observant enough to see that the car was not operating just as it should, will react favorably on the car owner. It gives the impression of more than a mercenary interest in the owner's welfare.

If you think that all of your cars are operating at full efficiency in the hands of their owners, just stand on the boulevard for an hour or, better still, station yourself at the foot of any hill in your vicinity and watch them as they pass. You've tried many unconventional selling stunts, why not try this unusual method of selling service?

Study Your Home Market

EVERY automobile dealer or repair shop proprietor sooner or later feels the effect of changes in the general business conditions of the United States. In fact, it is not too much to say that his prosperity is affected to some extent by upward or downward fluctuations throughout the world. These facts are so well known that they do not need emphasis. They are important, but they are not more important than your neighbor. The man who lives around the corner or down the road a way is your customer. He, too, is affected by world conditions; otherwise you would not be. But local conditions often are such that a national wave of prosperity or of depression may be greatly delayed in reaching a particular community or vastly modified in its intensity when it does come. That is why the wise dealer with a keen eye for the general business trend has a still keener one for the corn fields and the wheat fields of his own neighborhood. He does not permit himself to be deafened by the cumulative din of forecast and prediction that thunders over the country with every changing trend of business. He keeps his feet on the ground and his eyes and ears open for signs of the home market.

Woods and Waters "Ask 'Em to Buy"

A REGULAR he-man, even as you and I, was on his way to work, head down, thinking of some problem of the day, when his attention was attracted by some subtle influence to a window display that fitted the natural trend of his thought when the cares of business were laid aside. The scene was a camp in the north woods; a gun stood against a tree, while a rod and fishing tackle were near by. In front was a camp fire made with a few sticks, some red paper and an electric lamp bulb underneath, while around the fire was arranged the cooking layout and metal dishes, as though the evening meal was being prepared.

What did it all mean? Was it a sporting goods store? Not at all. It was a music store, and at one side of the outdoor display was a small phonograph. The message was obvious; the suggestion unmistakable after the early fishing trip, the hunt through the woods, the supper and camp fire, some music to make the end of a perfect day.

What does this mean to the automobile or accessory dealer? Even this, that the same outdoor appeal can illustrate some other point. A storage battery, for example, lighting some small bulbs in the tent, with perhaps a sign reading, "The battery is small but it lightens the dull hours of a camping trip."

In the same way, tire patches, a pump, and many other items could be displayed, their basic necessity needing no explanation to the motorist when stocking up for his summer jaunt in the woods.

Can You Afford to Be Without— *A Washrack?*

A MOTOR car is more easily worked upon when the parts are clean. This holds true of body and chassis as well as such parts as the engine or rear axle. In many shops and maintenance stations it is made a practice to first clean the car before any work is done upon it. This, in the minds of those who do it, makes for better shop morale and increases the efficiency all around.

Such a procedure naturally calls for facilities to properly wash and clean a car. A well-equipped washrack is a decided asset to any service station. The cost of maintenance is not very much and when a washrack is used in combination with a greasing and oiling platform, it makes for a profitable investment in the majority of cases.

The touring season is here and there will be many cars parked over night in the dealer's service station. Especially is this true in the smaller towns where there are no garages devoted strictly to storage. Very often the tourist wants to have his car washed over night so it will be ready for him in the morning. He does not like to be told, "We do not wash cars here, but you can have it washed down the street at Blank's." Maybe Blank has no storage facilities and no tired driver wants to take his car around the town to various places for the little services he should be able to get in one place. There is considerable to be gained when a service station attendant is able to say to the tourist, "We will have your car washed, cleaned and greased in the morning for you." Once established, the washrack gives another chance to increase the earnings of the shop.

Better Merchandising

THE manufacturers and jobbers who belong to the Automotive Equipment Association have voted an assessment on their firms of $125 each to improve the merchandising of automotive equipment and accessories. Their hope is that through the educational work that is being done through their merchandising department that every retail store in this country will be improved and that more goods will be sold.

Of course this work undertaken by these manufacturers and jobbers is not entirely unselfish. If the retailer sells more goods, so will the jobber and the manufacturer. All will benefit. The point is here: at present the manufacturer is willing and ready to manufacture and the jobber is quite willing and anxious to job, but neither can do more business than the retail dealer will permit them to do. So it is the dealer's business that must be increased, as he is the neck of the bottle.

The strange thing about it all is that the retailer should wait for some one to come along and help him wash his windows, display his goods, advertise and ask folk to buy his wares. He went into business for the purpose of selling things, so why not get busy on the well known lines of merchandising and sell every person in the neighborhood who is eligible to buy?

It would be a good joke on the manufacturers and jobbers if all of the retailers in this country would make themselves so efficient that the lessons provided will not be needed. Why not put this joke over?

Associated Motors Merger Completed

Nine Companies Form $80,000,000 Corporation

Passenger Cars and Trucks of Various Capacities to Be Made

CHICAGO, July 1—Announcement was made here today for the completion of the organization of the Associated Motor Industries, negotiations for which have been in progress for about 10 months as related from time to time in MOTOR AGE.

The company as now organized is an $80,000,000 corporation chartered in Delaware and has acquired by purchase full ownership of nine companies manufacturing automobiles, trucks, parts and equipment. Following are the nine companies:

National Motor Car & Vehicle Corporation, Indianapolis, Ind.; manufacturer of National cars.

Covert Gear Co., Lockport, N. Y., manufacturer of transmissions, clutches and other car controls.

Recording & Computing Machines Co., Dayton, O., manufacturers of ignition systems, starters, magnetos and other electrical equipment.

Jackson Motors Corp., Jackson, Mich., manufacturer of Jackson automobiles and four wheel drive trucks.

Kentucky Wagon Mfg. Co., Louisville, Ky., manufacturer of Dixie Flyer automobiles, and of trucks, wagons, wheels and bodies.

Saginaw Sheet Metal Works, Saginaw, Mich., manufacturer of sheet metal parts for automobiles and trucks.

Traffic Motor Truck Corp., St. Louis, Mo., manufacturer of Traffic Trucks.

Murray-Tregurtha Corporation, Boston, Mass., manufacturer of gasoline engines.

H. F. Holbrook Co., New York City, manufacturer of automobile bodies.

The officers of the corporation, headquarters of which will be at Dayton, O., are: Chairman of the board, Will I. Ohmer, president, Recording & Computing Machines Co.; president, Louis Ruthenburg, formerly general manager of Delco Light plant of General Motors Corp.; vice-presidents, A. A. Gloetzner, president, Covert Gear Co.; Robert V. Board, president, Kentucky Wagon Mfg. Co.; T. C. Brandle, vice-president in charge of merchandising of Traffic Motor Truck Corp.; George M. Dickinson, president, National Motor Car & Vehicle Corp.

Ohmer, who, as chairman of the board, will have entire charge of the operations of the company, in an interview with MOTOR AGE today, stated that all the plants will be operated and that for the present the products of all of them will be continued. These include the Jackson, National and Dixie Flyer automobiles and Traffic Trucks. It was said also that a truck would be manufactured at the Kentucky Wagon and Jackson plants. Development of a standardized line of cars and trucks is the ultimate object of the company, Ohmer said. This line is to include a four cylinder, a light six and a deluxe six passenger car and trucks of various capacities.

The companies in the merger have been acquired by purchase, payment being made in stock of the new corporation on the basis of actual inventory valuation of the various companies.

Negotiations are now in progress for the purchase of another group of companies, Ohmer said, for which additional stock will be issued. He said that in acquiring the first group no cash was spent except in taking up bonds and paying off some bank indebtedness of member companies. A $6,000,000 bond issue is being arranged to aid in paying bank loans and to give additional working capital. It is also understood that some preferred stock will be offered to the public.

Detailed plans for operation of the plants have not yet been worked out. Ohmer and other officials will begin a tour of inspection of the various properties next week to determine the most economical methods of operation. Present plans include automobile assembly plants at Boston, Indianapolis, Louisville, St. Louis and Oakland, Cal. The company has no plant at Oakland, but is understood to be negotiating for one.

Plans include a subsidiary dealers' financing organization capitalized at $35,000,000. This plan will permit the dealer to sell cars and trucks on a small cash payment from which he will take his discount or commission and to accept for the balance notes which he will turn over to the finance corporation. Between 600 and 700 banks have agreed to buy these notes from the finance company, Ohmer said.

Ohmer said immediate steps would be taken to enlarge the dealer organizations handling the various products and that as quickly as possible the financing plan would be made available to them all.

As to the parts manufacturers, Ohmer said the new corporation will use nearly the entire output of the various plants, but that any surplus would be disposed of at inside cost to other manufacturers.

In addition to the officers, members of the board of directors are as follows: James R. Duffin, president, Inter-Southern Life Insurance Co., Louisville, Ky.. H. G. Stoddard, treasurer, Wyman-Gordon Co., Worcester, Mass.; H. V. Hale, general manager, Saginaw Sheet Metal Works; H. J. Linkert, treasurer the Recording & Computing Machines Co.; C. L. Halladay, vice-president and general manager, Jackson Motors Corp.; W. W. Sterling, vice-president, Jackson Motors Corp.; C. L. V. Exselsen, vice-president and treasurer, Roland A. Crandall & Co., bankers, Chicago; Guy Wilson, president, Traffic Motor Truck Corp.; Buell Hollister, Pyne, Kendall & Hollister, bankers, New York City; H. F. Holbrook, president, H. F. Holbrook, Inc.; M. Douglas Flattery, chairman of board of Murray-Tregurtha Corp.

Holiday Closing of Factories Will Limit July Production

Detroit Plants, However, Are Expected to Maintain Same Daily Schedules as in May and June

DETROIT, July 1—Many leading factories will be closed for inventory in the first week or two of July and practically all will be closed July 3 and 4. Because of this and because there are five Sundays in the month, there will be no production marks established, but practically every factory, and certainly the leading ones, will operate on the same daily schedule as set in May and June.

This means that Ford will be on a 5,000 daily schedule, Dodge 600, Maxwell 350, Hudson-Essex, 300, Paige-Jewett 160, Hupp 150, Studebaker 440, Buick 400, Oldsmobile 120 Chevrolet, 1,100, Cadillac 100, Packard 80, Wills-St. Claire 50, Lincoln 35, Liberty 35, Oakland 100, Dort 80, Columbia 50, Rickenbacker 30, Reo 100, Earl 60, Durant 100, Chalmers 25, Gray 20.

A number of factories are experimenting with light cars which may be introduced upon the fall market. These cars are by makers formerly exclusively in the $1,800 to $3,000 specialized unit field and will be supplementary to their usual lines. The cars will be priced from $1,200 to $1,500.

MASON BUYS OWEN TIRE PLANT

AKRON, O., July 3—The Mason Tire & Rubber Co., of Kent, at receiver's sale, has purchased the plant of the Owen Tire & Rubber Co. at Bedford, O., midway between Akron and Cleveland. The purchase price was $275,000. The Owen plant originally cost $1,200,000. According to O. M. Mason, president of the Mason Co., production of Ford size cord tires will be started in the Owen plant at once, with an initial output of 1,500 tires a day, thus giving Mason a total output of 6,000 tires daily and causing the company to rank with the larger tire manufacturers in the country.

LAUSON TRACTORS REDUCED

NEW HOLSTEIN, Wis., July 3—The John Lauson Mfg. Co. has made the following reductions in the prices of its tractor models:

	Old Price	New Price
Model 5	$1495	$1295
Model 21	1875	1675
Road Model	2100	2000

MOVE FOR SUNDAY CLOSING

INDIANAPOLIS, June 29—A movement to bring about Sunday closing for all car dealers of the Indianapolis Auto Trade Association is now under way.

Second Quarter's Output 725,000

Fordson Show at Kansas City Reveals Varied Tractor Uses

Dealers Learn That the Field for Sales Is Much Wider Than Many Had Believed

KANSAS CITY, July 1—Tractor dealers of Kansas City territory who came as spectators of the demonstration here June 20, 21 and 22, of the application of the Fordson industrially, discovered that their prospects for sales were twice what they had estimated them. The show was primarily to display the industrial uses of the Fordson, but the tractor dealers who had estimated the farm need as the prime one in tractors, became convinced here that their possible local sales are quite as plentiful off the fields as on them.

One dealer, for instance, who had been looking only to field crop uses of a tractor, placed an order for equipment for mowing the lawn of a country club in his small town. And when other dealers noted this sale, they began to perk up, for country clubs are multiplying fast in this territory.

The sale of Fordsons with trailers for use in retail lumber yards and for local deliveries, was also a strong hint to many of these dealers. This suggestion was the more vital, because there is a pronounced increase the past few weeks in business for the lumber yards.

Nearly every dealer who came to Kansas City during the show reported that he had strong hopes of a big trade in tractors this summer, for the usual work thought of for tractors, and the additional utilities of the tractor gave valuable guidance to expanded opportunities for business.

One of the striking features of the Kansas City demonstration was the use of the Fordson on tracks as a locomotive. A railroad track was built—using tractors—on the show grounds, and a Fordson, adapted as a locomotive with flanged wheels, hauled rock over these rails to a rock crusher, also on the grounds, that was operated by a tractor. This use appealed to half a dozen dealers in whose territories are debilitated railroads that have tracks not likely to be used to the fullest extent.

A light plant was erected in a tent by itself on the grounds, operated by a Fordson, which lighted the grounds and the tent.

The demonstration of trailer uses was novel. A tractor with rubber tired wheels hauled a trailer with passengers, between the show grounds and the downtown hotels. Tractors hauled trailers in a parade, in which 50 machines took part, and which covered a route including one of the longest and steepest hills in the city. Some of the parade tractors pulled various kinds of equipment, such as sweepers and graders.

Each Kansas City dealer had a Fordson in the parade painted with his own special colors.

The presence of 15,000 persons at this event, promoted only by a group of local dealers, seemed to suggest what might be done in any community, either by dealers or by other groups of business men.

HANOVER BUYS PARENTI PLANT

BUFFALO, N. Y., June 30—The sale of the plant and property of the bankrupt Parenti Motors Corp., to the Hanover Motor Car Co., of Hanover, Pa., has been announced by the Marine Trust Co., which has been acting as trustee for the creditors of the Parenti company. The price received is said to have been $225,000. The Hanover company was organized to manufacture a light car built around a two-cylinder air-cooled engine, to sell for about $250. It is expected that the Hanover company will move its jigs, machinery and equipment into the Parenti plant soon after July 1.

TO SHOW AMERICAN STEAMER

CHICAGO, July 3—The American Steam Truck Co., which is producing a steam passenger car, announces that it will show the car publicly for the first time at the Chicago Pageant of Progress which will open on the Municipal Pier Aug. 29. A carload of complete phaeton bodies has been received at the factory and it is expected that a number of chassis which have been under construction will be completed within a few weeks and sent out as demonstrators.

Slight Decline Likely to Follow June's High Record

Preliminary Figures Indicate Month's Production Will Exceed May's 256,000

NEW YORK, July 3—There is substantial reason to believe that production of passenger cars and trucks for June exceeded a quarter million. A preliminary survey of the shipping figures for the first three weeks of the month indicates that the total will be larger than in May when it reached 256,000. It is almost certain to be as large. Output for the second quarter, therefore, will approximate 725,000.

In the face of the tremendous business of the quarter just closing, it seems inevitable that there will be a seasonal decline this month. Spotty retail sales conditions in certain sections indicate that it already has begun, but there are no signs that it will approach the proportions of a slump.

Local Conditions Cause Drop

The falling off in sales already apparent has been largely the result of local conditions and is by no means general. It has been in certain sections of the south and in some industrial cities. On the other hand, trade still is brisk in Tennessee and North Carolina and in many of the manufacturing centers.

Buying of passenger cars in the farm districts, up to this time, has been chiefly by business and professional men. The real farm market has not opened and when this agricultural buying gets under way it may do much to hold up the volume of business.

Tractor Hauling Passengers at Kansas City Show

New England Dealers See no Let-Up in Sales for July

Both Summer Months to Be Featured by Buying as Usual

BOSTON, June 30—Boston distributors and dealers report that there seems to be no let up in the buying of motor cars. April was good because it followed the show in March. May was even better. And June has been exceptionally good.

It is nothing unusual to learn increases month by month since Spring have been 50, 75, 100 and even 200 per cent or more in some cases.

And this applies to the sub-dealers in the outside territories. Many of these smaller dealers were not keen on stocking up before the Boston show, and now they are running behind in orders just as the distributors in Boston are doing. On some popular lines now you cannot get an open or enclosed cars for some weeks.

The used cars are pretty well sold out, too. Many of the dealers are down to half a dozen and are getting rid of them fast. The Used Car Exchange is working out well because it has told the story to the public and sold them on the idea that they cannot trade in and get their own prices any more. The way the sales are coming along now the dealers feel there will not be the usual Summer slump in July and August which all of them looked for year after year. Nor do they expect cancellations of any great number. They all declare the increased sales are due to harder work by their sales organization, and better organized prices.

Maine Dealers Suffer From Law They Did Not Oppose

AUGUSTA, Me., June 28—Maine motor car dealers, particularly truck dealers, have just discovered that they overlooked a point when they did not oppose the new truck law that went into effect this year.

The law states that "no motor truck, tractor or trailer registered under the name of a dealer shall be used for other than demonstration or emergency purposes." Now Mr. Shorey, in charge of the motor vehicle law enforcement, interpets this to mean that a so-called service truck, that is a truck used in the general business of the dealer and specifically set aside for such a purpose, must be registered individually, and is not in the same class with trucks which are being demonstrated and offered for sale.

When Shorey made his interpretation public a howl went up. What he says, and what the law reads, does not coincide with what the dealers thought it meant when it was being passed. In other words they did not go into the matter of reading closely everything in the law from a lawyer's point of view. Shorey pointed out that the dealers were paying for the registration of their cars but half what the owners were paying.

Because of the dispute over the interpretation of the wording of the law and the intent of the legislature, the whole matter has been put up to Attorney General Shaw of Maine for an opinion. Meanwhile the dealers are doing a lot of thinking about where they will make a stand when there is more motor legislation presented at Augusta.

New Buick and Oakland Service Station in New York

NEW YORK, July 1—Alfred P. Sloan, Jr., vice-president of the General Motors Corp., in charge of operations, announces that arrangements have been completed with the Argonaut Service Corp. for the erection of a thoroughly modern and complete service building in the heart of the automobile district in New York, for the joint use of the Buick and Oakland organizations.

The building will be located on the east side of West End or 11th avenue, occupying the block between 5th and 56th streets, extending back 100 feet in depth. It will be of re-inforced concrete, six stories high, with a total floor space of 140,000 sq. ft. and will represent an investment in land and building of almost $50,000. The work will be rushed to completion by early fall.

Oakland owners in New York City have heretofore had to take their cars to Long Island City for service and parts.

June Sales in Milwaukee Up to High Mark of May

Dealers Start Into July With Greater Intensity—Parts Makers Still Very Busy

MILWAUKEE, Wis., July 3—June business, as analyzed by most Milwaukee dealers, equalled the May volume, with some able to report a progressive gain. The past month started off for some dealers rather less actively than April or May, but by the close of the period business had the same characteristics as before, dispelling any ideas some may have entertained that the peak of demand was past and a decline had set in.

No Effort Relaxed

No effort is being relaxed; in fact, selling work is being prosecuted with even greater intensity than in the rush season. It is recognized that resistance becomes stronger as the sales curve reaches the peak and the more willing customers have been satisfied.

May and June rank as the largest retal selling months in the history of the Milwaukee trade. Local dealers are not yet caught up on open car deliveries, while their enclosed car orders, forming a greater percentage of sales than ever before, will require from 30 to 90 days to fill at the present rate of receipts from distributors or factories.

Car Built by Elwood Haynes in 1893

THE automobile built by Elwood Haynes in 1893, said to have been the first successful automobile in America, was taken from its permanent place in Smithsonian Institute at Washington and shipped back to Kokomo, Ind., this week to appear in the celebration on July 4 of the twenty-eighth anniversary of the first run made by the car. A monument to Haynes, erected on the Pumpkinvine Pike at the place where the car made a run seven miles an hour July 4, 1894, was dedicated by the Indiana Historical Commission and by the Hoosier State Automobile Association. Owing to the early press date of MOTOR AGE, details of the celebration were not received in time for publication this week, but will be given later.

Georgia Dealers in Annual Meeting Report Sales Growth

Greatest Volume Is In Industrial Centers, But Higher Cotton Price Encourages Farmers

ATLANTA, Ga., July 3—The automotive industry throughout Georgia has experienced steady, even rapid, improvement the past two months, and conditions now are better than at any time within the past two years with the outlook for the remainder of the summer months exceptionally bright. This was the consensus of opinion among the leading dealers of the state, who attended the semi-annual convention of the Georgia Automotive Dealers' Assn., held at Macon, June 22. Dealers were in attendance from every section of Georgia.

At present the best sales volume is among the dealers in the larger industrial centers, though there has been a steady betterment of business among the smaller dealers the past two months. Recent increases in cotton prices, the dealers state, have helped conditions materially, and with the farm outlook getting steadily better farmers are more inclined to listen to sales arguments than they have been since the depression period first began the latter part of 1920.

Volney Williams, of Savannah, Ga., president of the association, presided over the business sessions during the day which were held in the Hotel Dempsey. The principal address was by A. R. Kroh, of the Goodyear Tire & Rubber Co., on "Efficiency in Sales and Service." Business of the day largely included a general discussion among the dealers as to present business conditions and the outlook, and plans for the future work of the association.

The legislative committee reported that it is prepared to give every attention to the interests of the automotive industry at the next session of the Georgia legislature, when there is a prospect of legislation being introduced that, if passed, will prove detrimental to the industry in this state.

It is likely that the association will follow the action of the Atlanta Automobile Assn., taken at the last summer meeting of that body June 21, and cooperate with the newly organized Georgia Bus Lines Association, in defeating legislation that is to be offered by the short line railroads of Georgia next year seeking to place the motorbus under control of the State Railroad Commission. At a meeting of railroad officials in Atlanta this week a tentative bill was adopted providing six principal points relative to motorbus control, and its passage will be sought when the legislature convenes again. Expressed briefly these points involve placing of the bus under the same jurisdiction as the railroads, subject to rules and regulation of the railroad commission. The Atlanta dealers have offered every cooperation to the bus operators of the state in the effort to defeat unfavorable legislation, and the Georgia dealers' organization expects to later take similar action.

Woman Successfully Manages Automobile Business

PITTSBURGH, PA., June 24—Miss Margaret C. Taylor, general manager of the Pittsburgh-Lexington Automobile Company, 5920 Penn Avenue, believes that she probably is the only woman who is the active head of a large retail automobile business.

She is eligible for membership in the "Old Timers' Motor Club," having been in the automobile business since 1905. She has been with the Pittsburgh-Lexington Company since its organization in 1908 when she began work there as a stenographer. Later she was bookkeeper and then general manager. Under her management the business has more than trebled in volume.

AUTO-LITE CO. OFFICERS

TOLEDO, O., July 3—Election of officers and acquisition of the selling organization of the Willys Light division has been announced by the Electric Auto-Lite Co., the new corporation formed by Clement O. Miniger to take over the assets of the Electric Auto-Lite division purchased purchased from receivers of the Willys Corporation for approximately $5,000,000.

Clement O. Miniger is president; D. H. Kelly and A. E. Buchenberg, vice-presidents; F. H. Landwehr, secretary; and J. H. Householder, treasurer.

PRIZES FOR PHOTOGRAPHS

Cleveland, O., June 26—Prizes of $100, $50 and $25 are offered by the Chandler Motor Car Co. to automobile tourists for the best photographs showing Chandler cars in interesting or unusual scenes.

Tire Sales for June Reached Highest Point in History

Large and Small Factories in Akron District Produced 2,500,000 Tires for the Month

AKRON, O., July 1—June was the greatest month from the standpoint of volume of sales in units, in the entire history of the tire industry in so far as the Akron district is concerned, not even excepting the short-lived period of abnormal production during early 1920.

Estimates show over 2,500,000 tires of every size and description manufactured in the Akron district, which includes the Mason Company at Kent, and the Seiberling Co., at Barberton, in June.

The Firestone Tire & Rubber Co. reports June was the biggest month in the company's history, with sales in units larger than ever before. Firestone produced nearly 750,000 tires in June, averaging 25,000 a day and running in excess of that mark during the latter half of the month.

The Goodyear Tire & Rubber Co. reports that its June sales of cord tires exceeded June sales of 1921 by nearly 100 per cent. Practically all other tire companies here report sales showing from 50 to 100 per cent increases over the corresponding periods of last year.

"We sold more tires in June than in any previous month in our history," state Firestone officials. "The demand seems very general for our products and comes from all sections of the country, the increase being mostly from dealers who have been carrying low stocks and are now in their full selling season. Manufacturers' business and export shipments are also increasing. With tire prices on so low a basis, the consuming public is purchasing freely, knowing that tire values are in accord with the times."

Akron companies report July orders so far booked do not indicate that there will be any appreciable diminishing of sales, at least during the forepart of the month, although a slight tapering off of production during the latter weeks is anticipated. The usual seasonal slump in sales which comes in August, it is stated, will cause manufacturers to reduce production and to perhaps stabilize the industry on a basis of about 75 per cent of present aggregate production.

HUDSON-ESSEX PRICE REDUCTIONS

DETROIT, July 1—Reductions of $50 each were made today by Hudson Motor Car Co. on five models of Hudson-Essex. Hudson four-passenger phaeton was reduced to $1645, touring to $1695, coach to $1745. Essex models reduced were the coach to $1295 and the cabriolet to $1195, a reduction of $100.

ILLINOIS GRAY DISTRIBUTOR

DETROIT, July 1—Simmons Handin Motor Co., 2211 South Michigan Ave., Chicago, has been appointed distributor of Gray cars for Northern Illinois.

Survey of Automotive Industry In Indianapolis Being Made

Trade Association Undertakes to Determine Number of Sales and Maintenance Establishments

INDIANAPOLIS, June 29—A complete survey of all the automotive establishments in Indianapolis is being made by the Indianapolis Auto Trade Association under the direction of John B. Orman, manager. Not only the number of the establishments in the sales, service, accessory end as well as of the industrial portion of Indianapolis automotive world is being taken, but the total number of employees in each place of business whether it is a one man service station or a large factory of the vehicle, parts or accessory end.

"The amazing thing about the preliminary investigation that confirmed us of the value of such a survey was the large number of men found employed in the smaller service establishments on a street that is not cnosidered an automotive row. We took Washington Street as a sample for the preliminary investigation. We found that there were about 70 automotive establishments of all sorts on that long thoroughfare. With the three factories (two of them assemblers), which are on the street we found that 1400 people earned their living from automotive work. It was quite surprising, for the highest previous estimate of the men in the sales and service and accessory ends on that street had been about 200, whereas the survey showed 400.

"When we get to Meridian Street, Capitol Avenue, and complete all the lanes that have automotive sales and service stations, I believe we shall find that the retail and service in this city is very near if not quite as large as the factory end. So often is Indianapolis dismissed as a manufacturing center and the number of automotive employes set down as the total arrived at by a factory count, that we overlook the equally important source of employment given by the trade and service, equipment and supply end of our industry.

"During May, Marion County, which includes the city of Indianapolis and nearby territory, sold 1,315 cars at retail, according to the records of the state registration bureau. Those records are generally a little late, and much May business will necessarily be carried as June business in the registration records. From a study of the records and the actual city sales made by certain Indianapolis dealers which were not entered as registered in May we feel sure that there were more than 1,500 cars sold here last month, which compares well with our factory output."

LECTURES FOR EMPLOYES

SALT LAKE CITY, Utah, July 1—The Intermountain Automotive Trades Assn., with headquarters in this city, has made arrangements which will permit employes of automobile companies to hear the Chamberlain lectures on automobiles which will be given in the Barrett Hall for four evenings. These lectures are given by P. E. Chamberlain, formerly of Denver, and their purpose is to develop the individual along fundamental lines so as to make him a greater asset to the organization of which he forms a part, said Secretary Snow. "Responsibility," "Organization," "Waste and System" and "Intelligent Selling" are the titles of the addresses.

Chicago Used Car Sales Take Unexpected Turn

CHICAGO, July 1—Dealers in Chicago and nearby towns report the sales of used cars have been taking a somewhat peculiar twist in the past two weeks. Cars that during the big buying season had practically no resale value are now in demand.

The Chicago branch of the Hudson-Essex company has found it necessary to advertise for used cars. This advertising, coupled with the sale of new cars has brought in enough coaches to take care of the call. The Hudson-Essex employed rather novel means of securing new car leads by sounding out those owners of last year's models who were in the market for a new car. The used car advertising has resulted in the sale of many new cars.

Other dealers in the medium price class find their used wares more in demand than new, while in the lower price class sales of both types have gradually dropped into the "regular run" again. High priced cars continue to sell well.

In the outlying districts, especially on Chicago's West Side motor row (Washington Blvd.) sales have been running along with an occasional spurt for the past month. Many of these dealers, now caught up on deliveries are again finding new prospects and selling cars to them.

GREETS MOTOR AGE BY AIR MAIL

A letter of greeting from the mayor of Lethbridge, Alberta, Canada, forwarded by the first International Transcontinental Mail Air Plane, has been received by the editor of MOTOR AGE. The letter, signed by Mayor W. D. L. Hardie, describes the scenic beauty of the country surrounding Lethbridge and states that a modern, well kept automobile tourists' camp ground is maintained by the city. The agricultural resources of the country also are described.

SERVICE ASSOCIATION OUTING

PHILADELPHIA, July 1—The Automotive Service Assn. of Philadelphia, which now has a membership of more than 70, is planning for its first annual outing, details for which will be announced soon. The organization has adopted emblem buttons having the association's initials in dull gold within a gold wheel, inlaid with blue enamel. The members are service managers and department heads in the service departments of car dealers.

Buick Takes Over Scripps-Booth Plant at Detroit

Enclosed Cars to Be Made at Rate of Four Hundred a Day

DETROIT, June 28—The taking over of the former Scripps-Booth plant by the Buick Motor Co. marks the preparation of this unit of General Motors to meet the demand for enclosed cars on an immediate delivery basis. Capacity for 400 enclosed cars a day is provided for, 10,000 monthly, or a total equal to the production of all models in the former plants of the company.

There are 350,000 sq. ft. of floor space in the former Scripps-Booth plant, including two large paint-houses now under construction in which will be located the enameling equipment. The plant will hereafter be known as plant No. 75 of the Buick factory and will be fitted throughout with modern assembling equipment, conveyors and other aids to large production.

All enclosed cars will be assembled here and shipments to dealers made direct from Detroit. The chassis will be built at the Flint plants of the company and shipped to Detroit where they will be assembled and the bodies set up. Enameling and upholstery work will be specialties of the new plant, attention having been given to place this on a highly efficient basis.

Formerly the bodies were shipped to Flint by a truck fleet from the body factories in Detroit, and fitted to the bodies in connection with the regular assembly work on all models. In addition to the traffic delays and the repeated handling of the bodies, the assembly of closed cars together with open models prevented highest production efficiency. By separating the two, higher production marks in each will be attainable.

The Scripps-Booth plant was built by the Saxon Motor Car Co. It was later taken over by Scripps-Booth, but during the war was occupied by the quartermaster's department. At the close of the war it was occupied for the manufacture of Scripps-Booth cars by that unit of General Motors which was discontinued early this year. Scripps-Booth service is now being handled in one of the buildings of the Northway engine unit of the corporation.

CONSOLIDATION OF PENN MOTORS

LEWISTOWN, Pa., July 1—Hilton W. Soffeld, president of the Penn Motors Corp. of Philadelphia, announces consolidation of the Penn Motors Co. and the Belmont company has a large plant, the former company at Riverton, N. J., burned in June, 1921 since which time the concern has been without a location. The Belmont company has a large plant, the former North American Tannery remodeled. In addition to Penn motor trucks, the company will manufacture the Corey motor-driven cultivator.

Tells of Home Benefits of Roads and Automobiles

Broader Opportunity Provided for Country Boys and Girls, Says N. A. C. C. Speaker

CHAUTAUQUA, N. Y., June 29—"Highways Benefit the Home" and "Highway Accidents Are Preventable," were the themes developed by Pyke Johnson and John C. Long of the National Automobile Chamber of Commerce, speaking before the biennial convention of the General Federation of Women's Clubs in session here.

Fresh food is made available for the city children, better schools and wider social opportunities are provided for the country boys and girls, as a result of improved highways and motor transportation, Johnson pointed out.

Guarding of danger points, prosecution of the careless driver, ample playgrounds and education in the schools will eliminate accidents, Long indicated.

"If every woman in America would enroll for the degree of Doctor of Safety, the accident question would soon be solved," said Long. Twenty-eight cities reduced their motor fatalities last year. Massachusetts cut down the number of traffic injuries 50 per cent. The four main symptoms and their remedies are these:

"1. Danger spots, such as curves, blind corners, busy intersections. Sufficient guarding by patrolmen or by signs is an immediate remedy, with improvement of the physical design of the danger spot as an ideal remedy. That is, a sharp curve may be protected, but it should ultimately be eliminated.

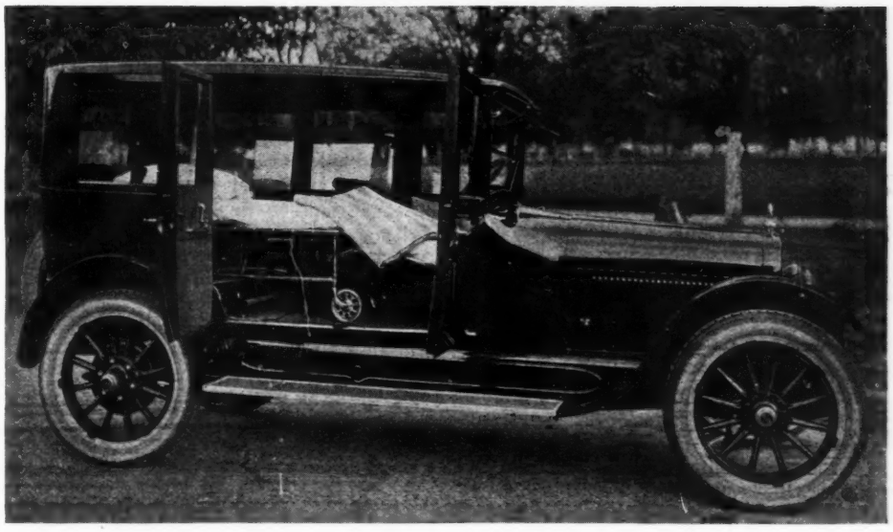
"2. Prosecuting the careless driver.—Citizens Complaint Bureaus, like those in Detroit and Syracuse, are needed to facilitate complaint against and prosecution of the reckless minority who are making the entire community pay the price of their heedlessness.

"3. Playgrounds—The school department should be consulted as to whether there is enough play space and whether there are enough play instructors to justify telling the children not to play in the streets. Pending the building of more playgrounds, if needed, certain streets should be roped off as play areas.

"4. Education in the schools—Children are naturally irresponsible, but through traffic games, playlets, and other instruction they can be trained habitually to conduct themselves properly in traffic."

SINSABAUGH RETIRES

NEW YORK, July 1—C. G. Sinsabaugh has retired as editor of Motor Life and will spend the summer at his home at New Rochelle, N. Y., pending his decision as to further business activities. He was formerly news editor of Motor Age.



Sedan Adapted to Business and Recreational Use

NORMAN, Okla., July 3—Modification of an automobile so that it is readily adapted to either business or recreational use has been accomplished by Myers & Myers, an undertaking firm here. The car is Buick sedan. For business use it may be readily converted into an ambulance or a pall bearers' coach. The illustration shows the car as an ambulance only a few changes which were locally at small expense were necessary The front seat was divided and hinges put on the back of the right-hand section so that it might be lowered to a level with the cushion. The right front door post was made removable, with clamp screws similar to the attachments on some of the older Buick enclosed models. This makes it possible to place a stretcher in the car. When the stretcher is removed and seat and door post returned to their original positions the car is a regular sedan for family use.

INDIANA MEMBERSHIP CAMPAIGN

Indianapolis, June 26—The board of directors of the Indiana Automotive Trade Assn. at a meeting held June 19 decided to launch a more intensive statewide campaign in order to advise local associations and automotive dealers of the state of several new endeavors of the association, and to expand the membership in order that the plans may be carried out to the benefit of the entire trade of the state.

D. C. Barnette, secretary of the association, will devote the major part of his time during the summer to trips through the state carrying the word of new plans and endeavors of the association to locals and to individual dealers of the automotive trade. Many matters of vital importance to the trade are expected to be settled in the next session of the Indiana legislature, and there are constant rumors of several bills which will do great harm to the trade if it is not sufficiently organized to make a strong case before the legislators.

MEMPHIS-BUICK ENTERTAINMENT

MEMPHIS, Tenn., July 1—The Memphis branch of the Buick Motor Co. held a two-day entertainment in Memphis recently with approximately 75 Southern dealers and service men in attendance, in connection with which a "Service Clinic" was conducted by the Buick company. A. H. Sarvis and R. P. Keating of the home office at Flint, Mich., were in charge of the meeting convention. According to George B. Gillespie, manager of the Memphis branch, the clinic was to improve the service now offered by the Buick company and to give the owners a better grade of service at a cheaper cost. For this purpose there was maintained at the company's new headquarters, 759 Union Avenue, a showing of a modern shop equipment by the use of which a better grade of service may be given in a short time. The new building has a floor space of 50,000 square feet. Representatives from Tennessee, Arkansas, Mississippi, and Louisiana were present. Special tool equipment was shown.

NEW 6-CYLINDER STEARNS

CLEVELAND, July 3—After having been for seven years exclusively in the four-cylinder field, the F. B. Stearns Co. is now producing a six which will be marketed along with the four. Both cars are equipped with Knight sleeve valve engines. Following are the prices for the new six:

2 pass. roadster	$2700
5 pass. phaeton	2700
7 pass. phaeton	2850
Coupe	3500
Coupe-brougham	3500
Sedan	3700

The prices of the four cylinder model remain as before, the roadster and 5 pass. phaeton being priced at $2250.

Filling Orders in Parts Business Harder Than Getting Them

M. A. M. A. Figures for May Business Are Beyond All Records

NEW YORK, July 1—Business in the entire parts and accessory field now is so good that filling orders has become much more difficult than getting them. Most plants are operating at capacity and many of them are working both day and night shifts.

The volume of business done by members of the Motor and Accessory Manufacturers' Assn. in May approximated $43,700,000. This was an increase of about $10,000,000 over April or 30 per cent. It showed a gain of $26,000,000 over January when the total was $17,320,000. The biggest total for any month in 1921 was in May with $26,780,000 and the percentage of gain in May, 1922, was the largest since the close of March, 1921.

Indications are that the total for June will be fully as large as for May and probably larger. Commitments placed by passenger car and truck manufacturers for July are fully as heavy as they have been for any month since production approached present record proportions. Numerous companies in the parts field have commitments running through September. Manufacturers expect something of a seasonal falling off in motor vehicle sales but they are convinced that there will be no serious slump in the volume of their business before the last quarter of the year and they do not look for the usual sharp drop at that time.

Credit conditions are highly satisfactory. Most vehicle manufacturers are discounting their bills and the total of past due accounts has become practically negligible.

TO INVESTIGATE GASOLINE PRICE

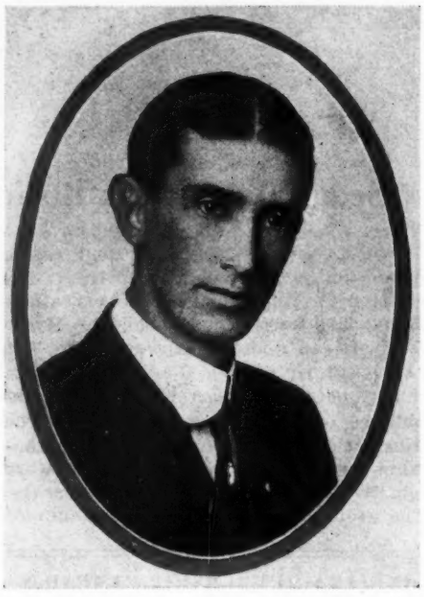
BOSTON, July 3.—One of the last acts of the Massachusetts legislature, passed and sent to Gov. Cox to sign, which he did, was a bill to investigate the price of gasoline in Massachusetts. The measure calls for a report to the next legislature. The investigators will also delve into the question of accurate measure of pumps, and the leasing of pumps to dealers by the big oil companies, it is stated by those who have been following the legislative session this year.

NEW CAB COMPANY FORMED

NEW YORK, June 30.—The Diamond Taxicab Co. has been launched, with Frank L. Klingensmith, Frank F. Beall and Harry T. Hanover, president of the Apex Motor Corp., among its backers. They will manufacture a standard cab to sell for approximately $1,200. The new company states that its first fleet of cabs for New York City will number 1,000 and that the contracts for the first unit of 250 have been executed.

The taxicab will be of the town body type with rather less glass than the conventional cab. The panels will be removable, so that they can be easily replaced in case of accident. The units will be made very accessible, interchangeable and easy of replacement. One of the novelties of construction is the removable upholstery. When the cushions and back are removed the whole inside of the cab can be washed out with a hose without doing any damage to anything remaining.

New Manager of Kansas Trade Association



TOPEKA, Kans., July 1—At a meeting of the Automobile Trade Association of Kansas held recently at Salina, Phil E. Zimmerman, of Lindsborg, Kan., was elected secretary-manager of the association. Zimmerman succeeds A. L. Oliger who resigned.

The new secretary is widely known in the automobile trade throughout the state and formerly was general manager of the Hagstrom Corporation which manufactured spark plugs and other automobile accessories. The state headquarters of the association will be maintained until winter at W. H. Imes Automobile Company in Topeka.

In cooperation with the Board of Directors, Zimmerman is working out a program of the association activities which will include a credit and collection department.

Y. F. STEWART TO MAKE COATS

COLUMBUS, O., June 30—The Coats Steam Car Co. has been taken over by the Y. F. Stewart Motor Car Mfg. Co., with a capital of $2,500,000 and has purchased the former plant of the Immel Co. in this city which was sold by the receivers several months ago. The Stewart corporation will have plants at Bowling Green and Louisville, Ky. The company will turn out the low priced steam car developed by G. A. Coats, who will be vice-president and general manager of the corporation.

Houston Dealers Reorganize Association; Employ Secretary

Arbitration Board to Hear Customers' Complaints Is One Item in New Program

HOUSTON, Tex., July 1—The reorganized Houston Auto Trades Association was formed at a special and well-attended meeting of automobile and accessory dealers of this city held June 26. F. W. Mozart, the new secretary-manager, was introduced by President C. W. Manford, who announced that the new executive will maintain an office and give his full time to the work of the association.

One of the first duties of the secretary-manager, it was announced, will be the listing of all buyers with whom merchants have had unsatisfactory dealings.

The new body intends to establish an arbitration board with which any customer may lodge a complaint against any dealer with the assurance that a complete investigation will be made and justice done.

The new secretary-manager stressed the necessity of building up confidence between the car buyer and dealer. He has set the membership goal at 100 and more than a score of firms signed up immediately. Yearly dues were doubled to take care of the extra work assumed by the association in establishing a central office.

The association will be a strictly business body. There will be no entertainment programs, although meetings are expected to be held weekly.

Joe Thomas Wins Shrine Race in Duesenberg Special

SAN FRANCISCO, June 24 — Joe Thomas won the Shrine Special 150-mile race in the San Carlos Bowl here June 14, in 1:23:24, at the rate of about 109 miles an hour. Thomas drove a Duesenberg Special, and, taking the lead from De Paolo in the fifth lap, held first place for the remaining 115 laps of the track. From this point the race became a procession, but the 15,000 members of the Ancient Arabic Order, Nobles of the Mystic Shrine, stayed through the contest, cheering the rest of the drivers as they changed places, just as if the race was not already won. Roscoe Sarles was second in 1:26:43 4/5; Art Klein, third, 1:27:26; Petro de Paolo, fourth, 1:28:45, and Ralph de Palma, the fifth who stayed in the race, was flagged.

$400 AIR-COOLED CAR

CLEVELAND, July 1—A light weight, air-cooled, four-passenger, four-cylinder car, which will sell for approximately $400 has been designed by F. F. Cameron Cleveland engineer who will form a company for its manufacture here and in England. The car complete, weighs but 1,000 pounds.

IN THE RETAIL FIELD

Wills Ste. Claire Co. of Illinois has moved into new headquarters at 2330 S. Michigan avenue. Dayton Keith is president of the company.

Gambill Motor Co., Chicago distributor of the Marmon and Hupmobile cars, has established a north side branch at 4017 Sheridan road.

Jerome P. Parker-Harris Co., formerly at 279-283 Madison avenue, Memphis, moved this summer to the building owned by the company at the northeast corner of Monroe avenue and Landerdale street which has been occupied by the Buick Motor Co. factory since 1917. The Buick company is getting into their new building on Union avenue just east of Myrtle street built by Dave Dermon and leased to that company for a term of years.

Rubber Association of America, New York, has removed its general offices from 52 Vanderbilt avenue to the Fisk building at 250 West 57th street.

Frank Dreuillard, formerly assistant superintendent of Maxwell in Detroit, is now Maxwell dealer in Pontiac territory and reports sales far in excess of any previous record of the Maxwell here.

Jacksonville, Ill., Automobile Dealers Association manages to keep up the interest during the summer months by various enlivening stunts. At the last regular meeting, it was voted to put on a frolic and platform dancing party on the evening of July 11 and the profits will be used to furnish a room in a new hospital now under construction in that city.

Herrin, Ill., Service Co. has been organized with capital stock at $50,000. The promoters include R. A. Haley, Bert Harrington, and V. C. Clark. The company will handle motor vehicles, equipment and accessories.

C. A. Butler of New York has purchased from L. C. Minard his automobile repair business in Great Barrington, Mass.

F. & H. Ball Bearings which were used by motor car manufacturers in this country prior to the war, are again available, as the Jarosch Bearings Corp., of 1737 Broadway, New York, has been appointed sole import representative for the United States and Canada by the F. & H. factories.

Colt-Stewart Co., New York, has been formed here to take over, on July 1, the business of the Maxwell-Chalmers Distributing Corp., which handles the Metropolitan distribution of the Maxwell and Chalmers lines.

Atlas Axle Co., Wilmington, Del., has been organized to take over the American Machine Co. of Newark, Delaware and the Lobdell Car Wheel Co. of Wilmington. It has a capital of $500,000 in common stock but none of the stock is available for sale.

White Company, Oakland, Cal., has commenced construction of a building at the corner of East Twelfth street and Fifth avenue, extending still further the range of Automobile Row on Twelfth street. The new building will be 90x100, one story, with provision in foundations and side walls for the addition of another story when it is necessary. It will house the offices of the White company on the mainland side of San Francisco Bay, of which C. L. O'Brien is manager. It also will contain a service station for White trucks, and a factory branch for assembling these trucks.

Old Hickory Tire and Tube Co. has opened at 1159 Broadway, Nashville, to handle in middle Tennessee and central Kentucky the Old Hickory Cord and fabric tires and tubes and Red Giant tubes.

Harry Hintz Motor Co., Elgin, Ill., distributors of the Dodge Bros. car in the Kane county territory, will have a new home next fall. A fine building of brick, two stories in height is under construction at 156 Grove avenue. The dimensions are 60 by 190. The present quarters have become outgrown.

James C. Soenksen Co. has been organized at Aurora, Ill., and will open a garage and sales agency at 67 South Broadway. Capital stock has been fixed at $20,000. The promoters include J. C. Soenksen, R. C. Irow, and C. E. Crouse. It is proposed to handle various lines of motor cars, trucks, tractors and accessories.

Ijams & Johnson, 305 South Main street, Bloomington, Ill., have sold their garage and sales agency to L. A. Patton and the latter will handle the same line, distributing the National, Mitchell and Westcott cars, Republic trucks and also a line of accessories and other supplies. Ijams & Johnson will engage in other business.

Oshkosh (Wis.) Cylinder Grinding Co. has been organized by John Roble, O. A. Keller and C. G. Bebel and incorporated with $40,000 capital It is opening a general automotive repair and machine shop which will specialize in reboring engine cylinders and other precision repair work on cars, trucks, tractors, etc.

Fay L. Cusick Garage, 6516 Greenfield avenue, West Allis, Wis., suburb of Milwaukee, has been purchased by M. R. Merry, formerly Buick dealer in Racine, Wis., who will continue the business as well as the merchandising and servicing of Maxwell and Chalmers cars, represented by the Cusick company for several years.

W. A. Knaak Motor Co., Sheboygan, Wis., will build a $20,000 addition to its main building at Georgia avenue and South Thirteenth street. It is dealer in the Maxwell, Chalmers, Oakland, Chandler and Cleveland, having held the Maxwell franchise continuously for 14 years.

Overland Sales Co., Green Bay, Wis., has been incorporated with a capital stock of $15,000 by Perry S. Wagner, John Welsh and John E. Martin, to act as district distributor and dealer in the Overland and Willys-Knight in Brown county and vicinity.

L. B. Lockwood has opened a new tire store and tire repair shop at Stoughton, Wis. He is featuring Swift cord and fabric tires.

D. and W. Motor Sales Co., 4701 W. Madison street, Chicago, Hupmobile agency, has been purchased by Harry W. Cassleman, president of the West Side Nash and Stearns Co. The new purchaser will continue to handle Hupmobile cars.

Edgewater Motor Sales Co., 5360 Broadway, Chicago has been organized to handle Earl and Liberty lines. James Betourna is president of the Company and J. A. Henry is secretary.

Geo. W. Andrews has been appointed general manager of the W. V. Faunce Motors Co., Chicago distributors of the Oldsmobile. He succeeds J. S. Geneley who went to Pittsburgh to open an Oldsmobile distributing branch.

Dashiell Motor Co., Dodge distributors in Chicago, have moved from 2420 S. Michigan avenue to larger quarters at 2542 S. Michigan avenue.

RESTRICTING TRUCK LOADS

MONTREAL, Que., July 3—The use of the heavy truck in the Province of Quebec is likely to be further curtailed by the by-law which the Executive Committee has submitted to the City Council for approval, for it proposes to limit the weight of the load on these vehicles to 6,000 pounds, even with pneumatic tires. There is no restriction in the by-law as to the weight of the truck itself.

ACCESSORY MEN HOLD OUTING

PHILADELPHIA, July 1—About 100 members of the Automobile Accessories Business Assn. and their guests went out to the Betzwood Farms Inn, at Betzwood, Pa., June 23, where the annual June outing was held amid ideal surroundings.

USED CARS SOLD OUT

DANVILLE, ILL., July 1—The used car market here is much stronger, due to the difficulty in executing orders for new cars in a number of lines. One firm here which usually carries twenty to thirty second hand cars, has been able to reduce its stock to a half dozen, while some that usually have a dozen or more, are completely sold out. It is stated that many prospects who ordered new cars and to whom delivery could not be made, invested in a used car, rather than be without any and will drive such cars until the new models are received. It has been several years since such a condition prevailed here and the dealers are thankful over their success in cleaning up so effectively on their second hand stock.

San Carlos Racetrack to be Rebuilt for 250-Mile Affair

Purse of $25,000 To Be Given Victor in October Coast Classic

SAN FRANCISCO, July 1—The San Carlos Speedway, property of the Greater San Francisco Speedway Assn., which was destroyed by fire on June 19, will be rebuilt in time for a 250-mile race for a purse of $25,000, on Oct. 15, according to announcement by William Pickens, general manager of the Speedway.

Jack Prince, well-known speedway builder, who built the San Carlos bowl, will rebuild it. Prince is now at Kansas City, supervising the construction of a speedway there, but will divide his time from now to Oct. 15 between the San Carlos bowl and the Kansas City track. The new track probably will be a mile and a half, instead of the mile and a quarter it originally was, and Prince has made the promise to build the fastest track in the world for the big race in October. The grandstands will be enlarged to hold about 7,000 more spectators, and the race of Oct. 15 will be followed by a 500-mile race on New Year's Day, open to both 122 and 183-inch displacement cars, for a total purse of $50,000.

The track cost $200,000 and was very nearly covered by insurance. Plans for the new track, according to Fred Morton, president of the Greater San Francisco Speedway Association, call for an expenditure of $250,000. The fire started shortly before noon, from a cause not yet determined, but believed to have been spontaneous combustion in a heap of waste, shavings and pine splinters piled beneath the track, on which oil had dripped through the planking of the bowl. The heat of the first half of June is believed to have done the rest. The track itself was so soaked with oil and the framework of the stands so dried out by the sun that the flames travelled rapidly, and for more than three hours firemen from San Francisco, San Mateo and Redwood City battled in vain to save the bowl. Lack of water handicapped the fire-fighters, who finally had to tap one of the big mains of the Spring Valley Water Co., run the water into a ditch and then pump it on the blaze.

ONE COMPANY GIVES UP

MEMPHIS, Tenn., July 1—The Southern Automobile Mfg. Corp., organized in December, 1920, recently filed a petition in bankruptcy. Inability to finance the project brought about the action. The original plans contemplated a factory for the manufacture of cars. W. A. King organized the company as president. Lovick P. Miles has been acting president.

BUSINESS NOTES

Stevens-Duryea Co. has opened a factory branch at 2439 S. Michigan avenue, Chicago. The same company had a factory branch at that address several years ago. Bruce E. Adams is manager and Webb S. Adair is service manager.

Sundby Battery Co., Milwaukee, Wis., a widely known manufacturer of storage batteries, has decided to locate in Milwaukee and has purchased the large plant built by the A. C. Holtz Chemical Co. on the Cedarburg road, north of the city, but never placed in actual operation. The factory buildings were completed two years ago at a cost of about $2,000,000. The company has taken on 800 additional workers at its Bristol plant.

Motor Products Corp., Milwaukee, is a new corporation formed with a nominal capital of $3,000 to manufacture and deal in automotive parts and equipment. Headquarters have been established at 545 Broadway. The incorporators are A. B. Taylor, E. J. Fidlin and J. R. Taylor.

Kiel Development Co. has been organized at Kiel, Manitowoc County, Wis., by Walter Leeme, Walter Schuette and William Eickhoff to manufacture a number of patented devices, principally a new type of pneumatic tire embracing a unique design of valve equipped with an alarm device. The design has been in an experimental stage for more than a year and the concern expects to get into quantity production by July 15 or Aug. 1.

R. A. Austin, manager of the Nebraska Paige Co., Omaha, reports that there were 40 undelivered orders on the books for the new Jewett on June 26. He expects to be able to deliver sometime in July.

Universal Body Co., Mishawaka, Ind., announces a reduction in price of their touring car model for Ford chassis. The new price is $325.

Colyear Motor Sales Co. authorized factory distributors of parts for standard units has opened a parts station at 1209 W. First avenue, Spokane, according to Leslie Shaw, manager of the Spokane branch. The company will make Spokane the central distributing plant for its products in the Inland Empire.

Rickenbacker-Wheat Co., Cincinnati, Ohio, has been chartered with a capital of $50,000 to deal in automobiles and parts, especially the Rickenbacker line. Incorporators are Robert H. Wheat, E. H. Matthews, F. C. Bushing, E. R. Donahue and J. W. Matthews.

Andy Lustbaum, of Long Branch, N. J., Peerless and Maxwell distributor for Monmouth County, has opened a salesroom at Asbury Park on Main street exactly opposite the new Depot.

Frank S. Nea, formerly representative for the Peerless car at Passaic, N. J., has joined the staff of Andy Lustbaum of Asbury Park, N. J. as sales manager of the new Peerless and Maxwell store.

De Graaf Motor Car Co., of Plainfield, N. J. have taken on the sales of the Peerless 8 cylinder in the territory.

John T. Fisher Motor Co. has succeeded the Reo-Memphis Co. handling the Reo cars and trucks at 735 Union avenue. Fisher was formerly president and general manager of the Union Motor Car Co. and is president and manager of the new organization.

Murphy-Ijams Motor Co., at 1231 Broadway, Nashville, Tenn., are distributors at Nashville and in middle Tennessee, southern Kentucky and northern Alabama for the Marmon cars now and J. W. Austin is director of sales. A complete stock of Marmon parts will be carried and extensive show rooms maintained in Nashville.

Southern Motor Co., 631 Monroe avenue, Memphis, Tenn., has been appointed sole distributor for eastern Arkansas, northern Mississippi and that part of Tennessee west of the Tennessee river for the products of the Edward V. Hartford, Inc., of New York City, manufacturer of Hartford shock absorbers, spring bumpers and automobile jacks.

John M. Duff, Jr., has organized a company for the sale of Nash fours and sixes under the name of the Duff Nash Motor Co., at 1113-1119 South Broad street, Philadelphia. Duff for several years was associated with the retail sales department of the Philadelphia-Nash Motor Co., Broad and Polar streets.

H. A. White Auto Co. at 1071 Union avenue has been recently selected as distributor in the Memphis territory for the Durant car. They are opening some new territory for dealers and maintaining very handsome show rooms.

Philip S. Coyle, Inc., Haynes distributors of Oakland, Cal., will be established in their new headquarters on Webster street, near Fourteenth, by July 1, according to Wallace W. Nall, manager of the company. The building is 103 feet long and is in the heart of the downtown business district.

Colyear Motor Sales Co., distributor of Continental motor parts in all the cities along the Pacific coast, has opened a station at 274 Twelfth street, Oakland, Cal., under management of W. M. Phelps, one of the oldest traveling salesmen in the organization. This is the first station for Continental parts on the mainland shore of San Francisco Bay.

S. C. Purser, who recently sold out his interest in the Oldsmobile agency in Oakland, Cal., to his partner, H. G. Markham, is back in business again in the same city, this time as representaive of the Oakland Sensible Six.

A. F. Hoffman and W. E. Hite, owners of the American Auto Metal Works, Oakland, Cal., have purchased the Lake Garage in that city and will continue both businesses.

Imperial Motor Car Co., Nashville, Tenn., has negotiated a deal whereby the Packard Nashville Motor Co. is to be taken over and operated by the Imperial company at 1518 Broadway. The Imperial Motor Car Co. handled the Packard in Nashville from 1911 to 1919, when the Packard Nashville Co. was organized.

Lilly Carriage Co.'s new home at 219-225 Union avenue, Memphis, is nearing completion. The building is 90x200, steel truss type, fire proof throughout. The Federal line is carried. Owen Lilly, head of the company, is president of the Memphis Automobile Dealers Association.

Patton Motor Co., Omaha, has taken on the distribution of the Rickenbacker car in this territory.

E. E. Mockett, E. E. Jones and A. G. Hebb, all of Lincoln, have incorporated the Mockett-Jones Motor Co. with a capital stock of $25,000. The nature of the business will be the manufacture and sale of automobile parts and accessories.

Orange (Mass.) Garage has been purchased by George F. Cobb and Millard F. Estey, who will soon open a new salesroom. Frank L. Barney, the former owner, is to conduct a garage in St. Johnsbury, Vt.

Hupmobile Agency in Springfield, Mass., will be known hereafter as the Leonard Motor Co. instead of the Leonard-Pollock Motor Co. This concern distributes Hupmobiles in three counties. Its officers and heads of departments are unchanged. Walter C. Darling is in charge of sales.

Warner-Patterson Co., Chicago, manufacturing the Patterson Lens, will expand its activities by including the distribution of a large line of exclusive automobile accessories. The first addition to the line is Warner Liquid Solder, the distribution of which has already been started. A. T. Warner, vice-president of the company, is the inventor of the Warner Auto-meter.

BODY BUILDERS MEET

DETROIT, June 30—The automobile Body Builders' Assn. held a two days' convention in Detroit this week. The opening address was made by President John Graham, following which papers were read by H. H. Babcock, H. H. Babcock Co.; W. C. DuComb, Jr., American Chemical Paint Co.; L. V. Pulsifer, Valentine & Co.; and Armin Elmendorf, Haskelite Mfg. Corp. Addresses Tuesday afternoon were by E. J. Thompson, E. J. Thompson Co.; John W. McClure, National Hardwood Lumber Assn., and H. R. Conleigh, secretary of the service committee of the National Automobile Chamber of Commerce.

Standardization of seats and door latches was discussed by James Morrison, Highland Body Mfg. Co.; W. H. Ritter, English & Mersick Co., and C. F. Barndt, Racine Mfg. Co. The standardization committee of the association is composed of Barndt, James A. Daugherty, Robbins Body Corp., Indianapolis, and F. D. Suydam, Jr., Milburn Wagon Co., Toledo.

June is Best Month for Dallas (Tex.) Dealers

Some Men Report Business Increase As Over Fifty Per Cent

DALLAS, TEX., July 1—June was the best month of the year so far for the automotive industry in Dallas. It was the best month for the past year and a half, the retailers say. There was an increase in truck and tractor sales and a decided increase in sales of tires, tubes and accessories.

Some of the dealers reported business increased more than fifty per cent over the corresponding month of last year. So great has been the demand for automobiles that dealers are now concerned over the possibility of the demand exceeding the supply and fear that they will have to begin to take orders "for delivery" rather than "delivery on the spot," as has been the case for several months.

A $20,000,000 fruit, berry and vegetable crop, for which money has already been received, and a $40,000,000 wheat and oat crop for which farmers are now receiving money, have stimulated the buying in Texas. The business will be back to normal by Fall, the dealers say.

Fort Worth and Houston retail automobile, tire and accessory dealers reported from 20 to 25 per cent increase in business in June. Waco, San Antonio and Galveston reported 15 per cent increases. Amarillo, Plainview, Wichita Falls, Beaumont and Orange said business was 20 per cent better and dealers in other sections of the state reported increased sales.

TIRE COMPANY BUSY

CHICOPEE FALLS, Mass., July 1—The Fisk Rubber Co. is operating at full capacity. Since the beginning of the year the output of tires has increased continuously. The schedule recently adopted calls for a decided advance over the previous production rate, as did the latter rate over its predecessor. From 14,000 to 15,000 tires daily is the rate now.

INDUSTRIAL MOTORS MERGER

NEW YORK, June 30—While no official announcement has been made in reference to additional companies which will be included in Industrial Motors, Inc., the combination of the Selden and Atlas Motor Truck Corp., it is understood that negotiations are pending with at least three more companies, including one in Detroit, one in Chicago and one on the Pacific coast. The merger ultimately is expected to include a spring company and an axle company, as well as other parts manufacturers.

FORD BEARING PLANT

TROY, N. Y., June 30—The Green Island plant of the Ford Motor Co. which will be used for the manufacture of ball and roller bearings for Ford cars, trucks and tractors soon will be in operation.

CONCERNING MEN YOU KNOW

Edward J. Epsten of the Epsten Lithographing Co., has branched out into a new field and has secured the distribution in Omaha of the Columbia Light Six. He has not picked a place for his location as yet but he has several in mind, and he says it will be centrally located in automobile row.

Fred C. Rudisell, a former manager of the Omaha branch of the Firestone Tire and Rubber Co., has opened a complete tire service station at 1709-1715 St. Mary's avenue, Omaha.

Electric Service Co., 341 East Williams street, Decatur, Ill., has been appointed distributor for the Packard car in the Macon county territory, the first time that this car has maintained an agency in that vicinity.

Garland Automobile Co., of Broadway, New York, one of the oldest and strongest established of dealers in that territory has taken over the sale of the Winton car in Greater New York. The Winton company has sold to the Studebaker Corp. the building formerly occupied in New York by the Winton company.

William H. Eager, who has been vice-president of the Whitman & Barnes Mfg. Co., Akron, since 1918 has been elected president to succeed A. D. Armitage who resigned two weeks ago to devote his entire time to the J. H. Williams Co., of Brooklyn, of which he is vice-president and general manager. **Frank W. Oliver,** widely known as a salesman in the twist drill and reamer field, has joined the Whitman & Barnes organization as eastern sales maanger with headquarters in New York.

Kenneth W. Gardner, who was associated with the Dunbar-Sanders Co., of Boston, for a year and with the Albee corporation for a similar time, is leaving the Franklin-Jacobs Co., Pontiac, Mich., to become assistant to the advertising manager of Chevrolet Corporation in Detroit.

Emmett Paige, who was plant superintendent for the Oakland Motor Car Co., is now associated with the Jigg Bushing Co., as one of the owners, though not taking an active part in its operation at present.

W. H. Orr, Danville, Ill., has purchased the battery and electrical shop of the Sager Brothers, corner of Walnut and Chandler streets. The plant will be operated by the Orr Battery & Electric Co.

T. M. Livingston, who for the last ten years has been with the Franklin Motor Co. as service manager at Des Moines, Ia., together with John Sweezy, formerly connected with the Herring Motor Co., of Des Moines, have opened a general repair shop at 1101 High street, Des Moines.

J. F. Hanlon, an employe of the Beaver garage at Beaver and Urbandale avenues, Des Moines, Ia., has purchased the place.

Carl Swenson, an automotive distributor of Denver, Colo., has received the distributing franchise for the Transport truck for the Rocky mountain territory. The new agency is at the Swenson Auto Co., 1960 Champa street.

I. H. Merritt, of Denver, Colo., has purchased the business of Moser Auto Service Co., 1533 Lincoln street, Denver, and will operate it under the name of Merritt Auto Service Co. This is an authorized Studebaker maintenance station.

Leroy Eschner has resigned as vice-president and treasurer of the Monroe Tire Corp., Chicago. Eschner was identified with the automobile industry for a number of years, serving as Winton branch manager in St. Paul. He is former president of the St. Paul Auto Trade Assn., and Eschner plans to take a rest before announcing his plans for the future.

A. E. Woerner and Fred H. Williams have formed a distributing company, called the Woerner-Williams Motor Sales Co., to handle the Durant car in Denver, Colo. Their building is a two-story construction with a white tile front at 2109-2115 Champa street.

A. C. Scott, president of the Scott-Bury Motor Co., of Omaha, was elected chairman of the executive committee of the Omaha Chamber of commerce, at a meeting there on June 20.

C. H. Rickenbach has been appointed manager of the Hudson-Essex service station at Springfield, Ill. He had been engaged in the service department of the Hudson factory for seven years and, prior to this was sent to the West Indies to open maintenance stations.

Leroy Johnson, Joliet, Ill., who has conducted a garage, battery and maintenance station in that city for a number of years, was seriously injured when an automobile which he was driving near Ottawa, capsized in a ditch. Clouds of dust from other cars, obscured the driver's view of the road.

H. L. Stoutz, recently in charge of the wholesale department of the Capital City Auto Co., Studebaker distributors, is now general manager and Park Woodward, formerly with the Dodge distributors, is sales manager of the re-organized Demack Motors Co., distributors of the Overland and Willys-Knight.

Louis F. Burckart, traffic manager of the Flint chamber of commerce, has been appointed traffic manager of the Dort Motor Car Co., succeeding Thomas Cole, who died recently.

O. J. Reickert, for some years service manager for the Dunbar Hoag Co., Springfield, Mass., has become associate manager for the Springfield Motor Corp.

F. I. Rennert, who was New England distributor at Boston for the King a number of years, has retired from that agency. The factory has sent George Tate on from Detroit to take over the business until it can secure a distributor.

Frank E. Wing, New England Marmon distributor, who has carried on the business under his own name as an individual for the past 18 years, has decided to incorporate the business, and he has secured papers from the state making it the F. E. Wing Company, Inc. for $300,000. He is the principal stockholder and executive.

A. H. McIntyre, for the past year traveling representative in the east and Canada for the Haynes Motor Car Co., with headquarters at Boston, has resigned to accept a similar position for the Jordan Motor Car Co.

Walter H. Bliss, former manager of the Goodyear Tire branches at Boston and New York, and later with the Franklin Motor Car Co. at Boston, is now New England traveling representative for the Hudson and Essex lines with headquarters at Boston.

W. P. Cronin and J. S. Waddell have formed the Cooper Tire Co. of New England to handle that line in the Boston territory.

EXTENDING DEALER ORGANIZATION

HARTFORD, Conn., July 3—Wider and more extensive distribution of Hupmobiles is planned by the L. & H. Motor Co., of this city which controls a large part of the state of Connecticut. The L. & H. Motor Co. is appointing associate dealers to distribute cars. The first announcement is that of the Edward S. Clark Motor Co. which has a large establishment on Wethersfield avenue. Several other dealers have been appointed associates and are authorized to sell wherever they can get an order even if it is next door to the L. & H. Motor Co. Major Thomas W. Campbell and Fred W. Lycett, heads of the concern assert that within the next 30 days Hupmobile will have one of the largest if not the largest selling organizations in this state. L. & H. carry a large stock of cars and associate dealers do not necessarily have to stock since they can come to Hartford and get any model they desire. L. & H. have done a very snug business the first six months of this year and by reason of having ordered heavy when selling was slow were in a position to make immediate deliveries when some other dealers were destitute of cars.

DEALERS ON ANNUAL OUTING

PHILADELPHIA, July 1—A large gathering of members of both the Motor Truck Assn. of Philadelphia and their guests, the Camden Automobile Dealers' Assn., attended the eighth annual outing of the former organization June 24 at Kugler's Mohican Club at Morris-on-the Delaware, New Jersey.

Tractor Men Vote $30,000 More for Educational Work

Decide to Enlarge Work of National Institute of Progressive Farming, Recently Organized

CHIICAGO, July 1—The Progressive Farming Committee, which is part of the National Institute of Progressive Farming, met in Chicago last week and after reviewing the accomplishments of the institute since it was inaugurated this spring, adopted a budget providing for the raising of $30,000 beyond what has already been paid in order to cover the expenses of the remainder of this year.

Substantial increases in their appropriations have been made by members of the committee and an effort is being made to obtain additional subscribers among all members of the institute.

Guy H. Hall, director of the institute, made a report showing that in 30 days of active operation the information service sent out by the institution has been published in whole or in part in newspapers and periodicals having approximately 40,000,000 readers.

The Progressive Farming Committee is a department of the National Association of Farm Equipment Manufacturers. It is composed largely of representatives of tractor manufacturers and the chairman is Harry H. Bates of the Bates Machine & Tractor Co., of Joliet, Ill. Other members of the committee are J. B. Bartholomew, Avery Co., Peoria, Ill.; E. J. Gittins, J. I. Case Threshing Machine Co., Racine, Wis.; Finley P. Mount, Advance-Rumely Co., LaPorte, Ind.; J. A. Everson, International Harvester Co., Chicago, Ill.; G. L. Gillette, Twin City Co., Minneapolis, Minn.; C. S. Brantingham, Emerson Brantingham Co., Rockford, Ill.; Floyd R. Todd, John Deere Co., Moline, Ill.; A. H. Gilbert, Rock Island Plow Co., Moline, Ill.; E. B. Stone, Cleveland Tractor Co., Cleveland, O.; W. E. Skinner, National Dairy Assn., Chicago; E. C. Stone, American Hampshire Swine Record Assn., Peoria, Ill.

Following its meeting the committee issued a statement declaring that in its belief the National Institute of Progressive Farming has proven of great value to manufacturers of power farming equipment.

NEW "HURRYTON" TRUCK

Clintonville, Wis., June 30—The Menominee Motor Truck Co. of Wisconsin, Clintonville, has completed a new model of commercial car which will be marketed under the trade name of "Hurryton." It is of 1-ton capacity and is designed for duty where speed is an important consideration.

BURNED FATALLY IN GARAGE

OMAHA, Neb., July 1—Earl Dunkin of the Wallace garage at Wallace, Neb., was fatally burned last week when a gasoline torch exploded, setting his clothing on fire. He died next day.

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

18 Possible Causes of Engine Knocks

Q—We wish to have your opinion as to the cause of a knock in a model 35, 1914 Maxwell, this knock showing up on a real hard pull or when accelerating quickly from low speed. At 15 or 20 m.p.h., however, the knock disappears. The car is equipped with Atwater-Kent battery ignition instead of the magneto and has a Carter carburetor. We do not believe it is a piston slap as pistons are a good fit in the cylinders and are equipped with new piston rings, also with inner rings. In overhauling the engine we found it had been set ahead one tooth on the timing gears, but this was changed to time it according to factory marking. Do you think this is an ignition knock or could it be caused by the carbureter?—John A. Kraus, Covington, Ohio.

We are listing a number of causes for engine knocks and we have put these in the approximate order in which they are most likely to occur. The list is as follows:

1—Loose connecting rod bearings.

2—Connecting rods bent.

3—Connecting rods twisted.

4—Loose wrist pin, worn wrist pin bushing.

5—Carbon knock, aggravated by spark advance and either too lean or too rich a mixture which causes excessive heat in the cylinder.

6—Spark knock due to timing being advanced too much, aggravated by carbon in cylinders.

7—Fuel knock due to present day low gravity fuel, aggravated by high compression, noticed more in slightly carbonized engine than in one recently cleaned.

8—Piston slap due to worn pistons having too much clearance between cylinder and piston, aggravated by carbon in cylinders.

9—Main bearing knock, due to loose bearings.

10—Loose camshaft bearings.

11—Main bearing knock due to bent crankshaft.

12—Bent camshaft.

13—End play in crankshaft.

14—Loose flywheel.

15—Timing gear eccentric, or off center, so that it binds as it turns.

16—Gasket knock due to gasket being slightly out of place so that piston strikes it at top of stroke.

17—Cam with flat spot on heel.

18—Engine loose in frame of car.

From the symptoms you describe we would be inclined to think that the trouble might be in No. 9, No. 13 or No. 14, although it is not always possible from symptoms described to accurately state which one of the many causes may be responsible for trouble being experienced. In regard to your suggestion as to knock being due to spark or carbureter, however, we are not inclined to believe these are responsible, although you can easily check for these conditions.

To check the ignition you can set the engine on firing dead center and see if the interrupter points with the spark lever retarded open at this engine position. If they do the ignition is probably set correctly. Another way to roughly check the ignition setting is to have the engine idling and advance the spark and see if the engine is heard to run slightly faster. In regard to the carbureter, the mixture is probably too rich if the exhaust gas after the engine has warmed up thoroughly has a rank, strong odor, while a mixture that is too lean will usually show up by popping back in the carbureter and a weakness and inability to pull when the throttle is suddenly opened.

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department, but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

What Will Happen?

THESE BEARINGS WERE FITTED WITH VALVE GRINDING COMPOUND

Q—We have just overhauled a Buick engine and have fitted the main bearing by using fine valve grinding compound. After completing the job the crankshaft was removed and all bearings thoroughly cleaned by rubbing with the fingers and with clean cloths, after which the parts were thoroughly rinsed off with gasoline squirted on with an oil can and wiped well with clean cheesecloth. What we wish to know whether enough of the compound will remain imbedded in the metal to cause any serious damage to the bearings when the engine is run? This method of fitting gave an excellent surface but we are somewhat apprehensive as to how it will work in service.—J. Flengh, Lima, O.

Valve grinding compound is the wrong material to use. There is a compound that can be used for fitting bearings as you have done which may be obtained from any automobile supply house. While we do not feel that you have done exactly the best thing for the engine, the question now is the best way of correcting the condition. It is common practice to grind engine cylinders and pistons and this method has been done for years and found satisfactory, the percentage of emery dust or abrasive material which becomes imbedded in the steel or cast iron being so small as to cause no bad effect.

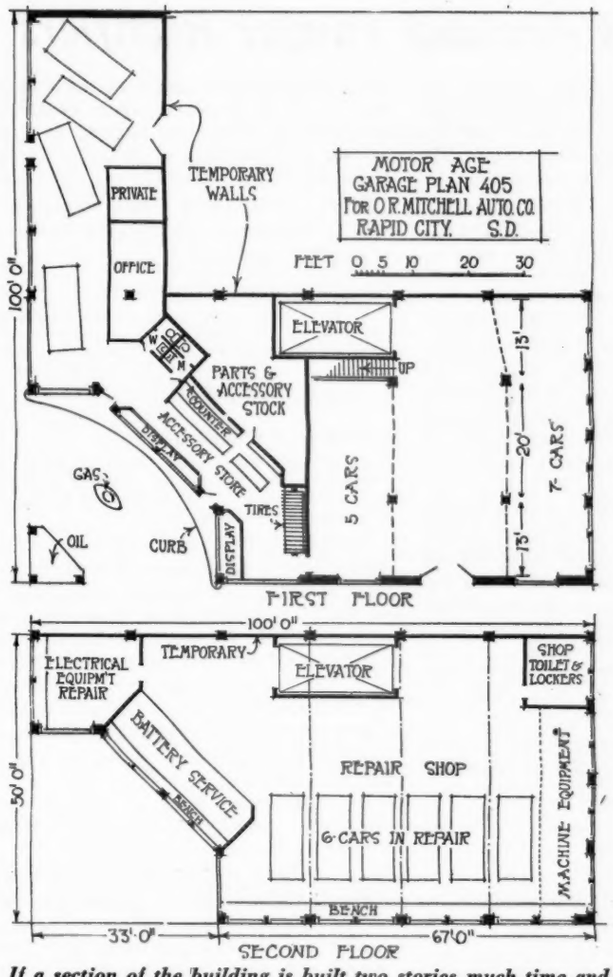
It is also sometimes customary to use a grinding paste in lapping in cylinders and pistons, the piston being worked back and forth and then being carefully cleaned with gasoline as you have done. In the case of the bearings, however, the circumstances are somewhat different for the babbitt being soft may permit the grinding compound to work into the surface in a way that would not happen to steel. To correct the condition, however, would mean instaling new main bearings throughout and going through the fitting job again, using the compound which is made for this purpose. It is therefore a question which you will have to decide as to whether you wish to assemble the engine and take a chance that the bearings will stand up or whether you wish to do the job all over again, putting in new bearings. We know of one case where valve grinding compound was used to fit wrist pin bushings and the job was apparently satisfactory, so believe there is a fair chance that the operation will prove successful.

GEAR RATIO OF VARIOUS TRUCKS

Q—Give the gear ratio of the rear axle of the following trucks: GMC model K16 one ton. Graham Bros., one ton and Graham Bros. 1½ ton. International model S ¾ ton. International model S model 21, one ton. International model 31-1½ ton. — Sutcliffe Reo Sales Co., Waterloo, Iowa.

The rear axle gear ratio we assume is the total gear ratio on a worm drive truck. Where the truck is an attachment or is chain driven the total gear reduction is not always the rear axle ratio, because in some installations a jackshaft is utilized. On the trucks listed below the final gear ratio can be considered the rear axle gear ratio.

The GMC model K-16 one ton 6 to 1, Graham Bros. one ton 6.28 to 1. Graham Bros. 1½ ton not known. The International model S ¾ ton-6.30 to 1. The International model S 21—one ton, 7. to 1. The International model 31 1½ ton, 8. to 1.



If a section of the building is built two stories much time and inconvenience is saved when the addition is made

How to Build for Addition Later

PLAN NO. 405

Q—Would like some help in planning a Dodge sales and maintenance building with a filling station on the corner. I have a space 100 by 140 ft. but can't afford to build quite a full size building, probably 75 by 140 ft., or 100 by 100 ft., whichever will be the best and cheapest. I would like to know about what it will cost to erect a building of this size out of concrete or tile, and would like to build so I can add another story later on.—O. R. Mitchell Auto Co., Rapid City, S. D.

Adding another story on a one-story building is almost like tearing down the one and putting up the other, from a standpoint of expense or of doing business while operations are in progress.

When the roof is taken off everything is left exposed to the elements. Even if the second floor is built in under the roof and the roof raised, the blocking jacks, braces, etc., that are necessary make the continuance of business very difficult. Much better final results could be obtained by putting up a section of the building equal in floor space to your one-story project, but building it two stories.

You could save money by this method, too; counting the remodeling and extra cost you should be able to save enough on the finished building to cover the cost of the elevator. If there is a probability of eventually having a two-story building, you would be much better off to build part of it now complete, then when business demands you can add the other section without any interruption.

We have made our layout with the idea of making the building appear complete by having the corner built up permanently two stories high with the "room to grow" all to the rear. The section of frontage used as showroom need only be one story if desired but could be two also. In case it is built two stories it would be better to build it deeper, probably back to the second post or about 34 ft., so that the second floor space would be of more usable proportions.

As stated before, if you are sure you will eventually build two stories this would be the best method but if you cover the whole lot with a one-story building you will have quite a large building as they go, and would not be bothered by the elevator problem. Of course, there are arguments for and against both styles of building.

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

ONE CAR BURNS OUT CONNECTING RODS AND ANOTHER BURNS UP ITS VALVES

Q—We have an Oldsmobile Six which has burned out the fifth connecting rod and after replacing it the engine heats up and knocks on a hard pull in high with spark advanced. The compression is very poor when the engine is cold, but after it warms up it gets better. Bearings are all tight. What is the cause of this trouble?

1—You do not make it quite clear whether five different connecting rods have burnt out, one after the other, or whether one has burnt out in the number five cylinder. In any event it is quite likely that this has been due to running without enough oil in the crankcase and in this case it is quite likely that the pistons and cylinder walls both are somewhat scored, which would account for the poor compression. This will also, no doubt, allow oil to work up into the combustion chamber, causing an accumulation of carbon which will cause knocking on a hard pull and especially with the spark considerably advanced. The knock is possibly a combination of spark advance, accumulation of carbon and piston slap.

2—Has there ever been invented a successful gasoline turbine?

2—No.

3—We have a Ford car in which the valves warp so fast that we have had to put in six in the last two months in number two and three cylinders. What is wrong?—Palace Garage, Hydro, Okla.

3—Warping of the valves can only be due to the use of very poor material or to an abnormal condition of heating and we would suggest in the first place that you would use authorized Ford parts. We would then suggest your checking the ignition to see that it is properly timed, with the spark in the retard position occurring with the piston approximately on dead center. We would then suggest your checking the carbureter to see that it is properly set, being neither too lean nor too rich, also check the valve lifter to valve stem clearance, which should be .018 to .$25 in.

REPLACING GRANT REAR MAIN BEARING

1—*How is the rear main bearing of a four-cylinder model D E 4 Grant engine taken up?*

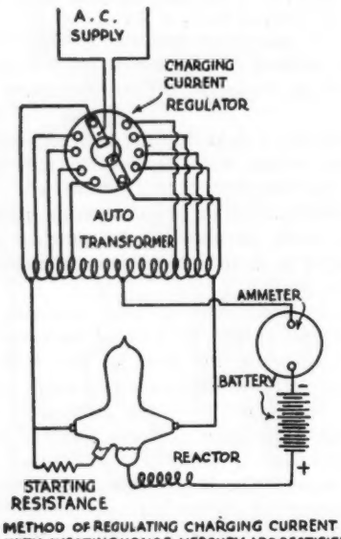
1—There is no adjustment to this bearing, as it is really a bushing instead of a bearing. When worn it is necessary to remove the flywheel, after which a plate held with about eight screws can be removed. When this plate is removed the bushing, which really acts as a main bearing, will come out with the plate. A new one can then be installed and the plate put back.

2—How is the gear taken off of the crankshaft? We have removed what seems to be a cotter pin, but have been unable to get the gear off as there is not room for a gear puller.—Jack L. Dane, Kalamazoo, Mich.

2—Would suggest that you drill and tap two holes in the web of the gear so that you can put in two studs. These should be located so that you can catch hold of them with whatever gear puller you have available.

Operating Principle of Mercury Arc and Tungar Rectifiers

Q—Publish complete internal wiring diagram of Westinghouse Mercury arc and Tungar rectifiers. State function of same and show how variation of charging current is accomplished.



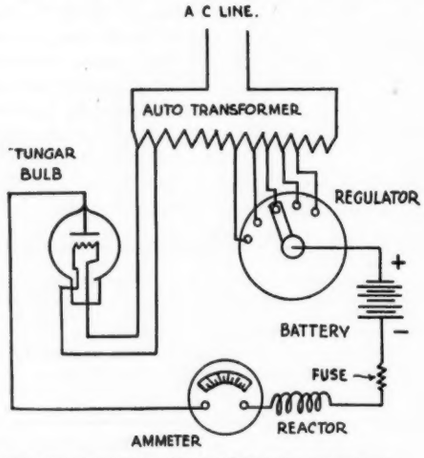
METHOD OF REGULATING CHARGING CURRENT WITH WESTINGHOUSE MERCURY ARC RECTIFIER.

1—Above is shown a sketch which gives the method of regulating the charging current with Westinghouse Mercury arc rectifier, this being a simplified drawing and not quite as complicated as that which shows the actual construction and location of every wire and terminal. Operation of the rectifier is based on the fact that the Mercury Arc will carry current in one direction only, that is from the side electrodes to the mercury pool. When the right hand side of the auto transformer happens to be positive, current will flow from the right electrode of the mercury bulb to the mercury pool and through the reactor to the positive battery and through the battery as charging current, the current going back to the middle half of the transformer which is negative with respect to the right hand side.

When the alternating current has reversed so that the left side of the transformer is positive the current then flows from the left hand electrode of the mercury bulb to the mercury pool at the base and again to the battery so as to give it charging current, the center half now being negative with respect to the left side of the transformer. The reactor coil shown at the bottom of the sketch acts somewhat like a flywheel and keeps the current from dying out. If this coil were not used the arc would die out in between current alternation and the action would not be continuous. The starting resistance is used for the purpose of allowing a limited current to flow when the bulb is tipped so that the two pools of mercury make a short between each other and cause a flash which starts the bulb operating. Rectifiers of this type have many detail variations and some complications added.

For example, some of them have an automatic electro magnetic means of tilting the bulbs in case the arc should stop for any reason but all work on the same general principle. To change the charging current it is necessary to change the impressed voltage and this is accomplished with the two point regulator as shown at the top of the sketch. As indicated the A. C. supply is connected to the outside of the transformer and which gives a 1 to 1 ratio of transformation, and therefore, gives the lowest charging current. If the rheostat handles should be turned to the left so as to connect to the inner-taps we would then have the full A. C. voltage supplied to the inner taps and the transformer would therefore, step up the voltage applied to the bulb and would give a higher charging current. There are, no doubt, other methods of regulating the charging current, but we are advised by the Service Department of the Westinghouse company that this is the method employed by them.

The operating principle of the Tungar rectifier is shown below. This is based on the fact that in a bulb filled with argon gas, current will flow from a cool plate to a hot filament but will not



METHOD OF CONTROLLING CHARGE RATE IN TUNGAR RECTIFIER

flow in the reverse direction. The auto transformer shown has connected to a small portion of its windings the filament of the Tungar bulb, so that a small current flows through the filament and keeps it red hot. Now when the right side of the transformer happens to be positive the current will flow to the battery and through it and the reactor and through the ammeter to the cool plate in the Tungar bulb and across the ionized gas to the filament and back to the left side of the transformer. When the voltage reverses, however, and the left side of the transformer becomes positive the action is not reversed and the current is not allowed to go back to the bulb in the other direction. Turning the regulator handle will connect the battery to more or less voltage and will, therefore, give more or less charging current. The construction of Tungar rectifiers varies somewhat with the concerns making them and with the size employed. The smaller sizes which are designed to charge one battery at a time having no regulation whereas larger sizes sometimes have a regular transformer instead of a single winding or auto transformer, but the principle of all of them is identical.

Secondary Current Strength

2—In a Dixie magneto, is the secondary current of the same strength on retard as on advanced position of breaker mechanism?

2—Yes.

Function of Condenser

3—Give in detail the function of a condenser. Also state the voltage required to charge same and how this is accomplished.—A Reader.

3—We assume that you refer to the action of the condenser as used in ignition circuits and in this connection it might be compared to a shock absorber as it has this function electrically. For this reason there is no particular voltage required to charge it but the greater the voltage the greater the charge, very much as on an automobile, the harder you hit the bump the more the springs will be deflected.

The inductive kick or voltage kick from the primary winding which is produced by the dying magnetism tries to cause a flash or arc at the interrupter points and this voltage shock is absorbed by the condensor just as a shock absorber would take the force of a bump. When the first force of the kick has subsided the condensor then rebounds or discharges electrically a slight flow of current going back in the reverse direction through the primary windings. The sudden stopping of the current produced with the help of the condensor gives the high voltage in the secondary which produces the spark.

NO ADJUSTMENT FOR REMOVING END PLAY IN GEMMER WHEEL

Q—In taking up the play in Gemmer steering gear on a 1912 Stutz Bearcat, is there any provision for removing the end play in the cross shaft to which the steering arm is attached?—W. W. Wilson, Lodge Grass, Mont.

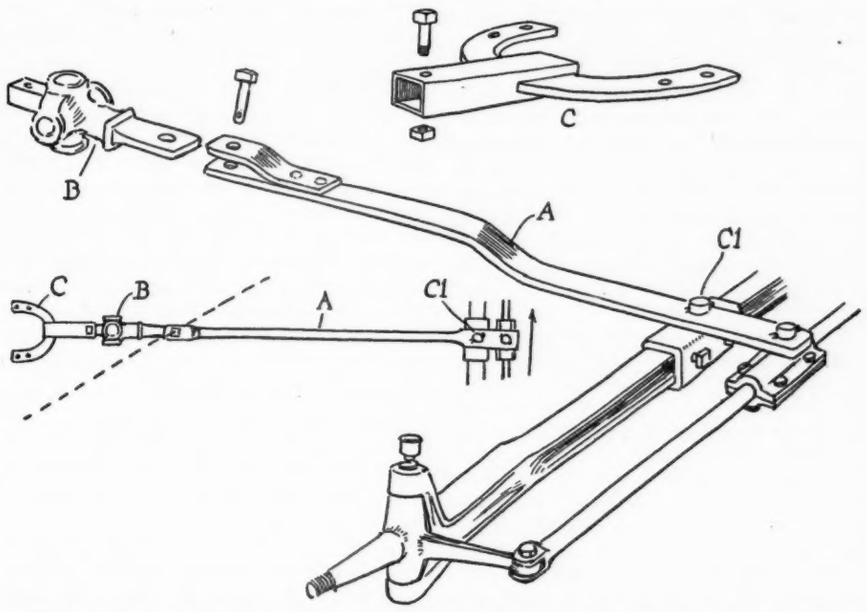
1—There is no adjustment for removing the end play in the Gemmer steering gear on a 1912 Stutz bearcat. In order to eliminate the end play it will be necessary to remove the steering gear from the car and replace the bushings which carry the cross shaft. The bushings and thrust plate can be secured from the Gemmer Mfg. Co., Detroit, Michigan.

REGAL ENGINE INFORMATION

Q—Advise the bore and stroke, width of rings and number of rings on each piston of Regal touring car, serial No. 1441, model F.—Moore, Ehrstein & Co., Grand Chain, Ill.

The bore of the Port Huron eight cylinder engine as used in the Model F Regal was 3 in. and the stroke 4½ in. The rings used were 3/16 in. wide of regular depth and there were three rings per piston.

ONE MAN TOWING ATTACHMENT



How the one-man tow bar is attached to the car and trailer. The universal joint is an old one taken from a Ford car

1—Publish a sketch showing method of making an attachment which can be used for towing a car without the necessity of having an extra man merely for the purpose of steering the car which is being towed. If possible make this design so that it can be attached to any kind of a car or steering gear. Also publish list of lighting plants, giving price, voltage, kilowatt capacity, etc.—Chastel Auto Co., Florence, Ind.

1—Above is shown a sketch reproduced from page 45 of the July 26, 1917, issue of MOTOR AGE. In this sketch in the upper right-hand corner will be seen a fixture which is supposed to be attached to the car which is doing the towing. The square opening being designed to take the shank of the Ford universal joint which is shown assembled at one end of the towing fixture. The rest of the construction is rather obvious from the sketch.

For universal service a slight variation in the type of the clamp used at the axle and tie rod might be required, and in this connection would suggest using semicircular pieces both for the axle and for the tie rod. These might be interchangeable so that cars could be towed which have the tie rod in front of the axle instead of in the rear. For use in connection with Ford cars the Ford Motor Co. makes a device suitable for this purpose.

The operation of the towing device depends on the fact that when the front car turns a corner the bar will pivot about the point "C 1," which will move the tie rod one way or the other just as though a person in the rear car had turned the steering gear. This will, of course, cause the rear car to follow properly.

In regard to the lighting plant specifications would say that complete information was given in the Feb. 16, 1922, issue of Automotive Industries, which can possibly be obtained at the library. A separate letter is also being written on this question.

Can an Ammeter Be Put On a 1916 Dodge?

1—Is it possible to install a regular ammeter in place of an indicator on a 1916 Dodge?

1—It is not feasible to put an ordinary ammeter on in place of the indicator, as the starter current goes through it and will burn out the usual type instrument. There are special ammeters made now, however, which not only indicate amperes but carry the heavy current safely.

Indicator Does Not Show Charge

2—What is wrong with the indicator when it does not show charge with the car going 25 miles per hour.

2—On this motor generator the charging current to the battery is regulated by means of two pairs of vibrating contacts located in the generator just under the commutator cover, and we would suggest your removing the commutator cover and examining these contacts, as they may be burnt and making poor connection with each other. There is also a third pair of contacts which close when the generator starts, to allow the current to go to the battery. In working on these vibrating contacts an ammeter should be connected in series with the battery by removing one of the heavy cables from the battery and connecting it to one ammeter terminal and connecting the other ammeter terminal to the battery post.

The safest way to do this is to get the ammeter connected and start the engine by hand, as if starting current is pulled through the ammeter it will probably burn it out, while if the meter is used and an attempt is made to install the ammeter while the engine is running other trouble will be encountered.

After the ammeter has been hooked in the circuit and the engine started by hand the two vibrating pairs of points can be held together so that there is no regulation and in this case a fair engine speed should give a rather heavy charging current, perhaps 10 to 20 amperes, which, of course, is entirely too much, as 7½ amperes is the charging rate recommended.

Variation in the tension of the springs controlling the vibrating points should now be made to give proper charging current to the battery without any holding of the vibrating points. If the charging current is too low, the springs should be stiffened and if the charging current is too high, the springs should be weakened. The adjustment of the two pairs of points should also be about the same, otherwise the one pair will burn faster than the other.

Oil Pump on Dodge

3—This car has two gages mounted on the dash, one labeled air and the other labeled oil. The oil gage is not connected, whereas the air gage is connected to the oil line. At present there is an oil pipe leading from the pump to the front main bearing. There is also a connection at the rear main bearing but no pipe is connected to it. Should a pipe from the pump be connected to it or is it all right to run the way it is?—Arndt Bros. & Parno Garage, Ituna, Sask., Can.

3—In regard to the oil gages used on the car in question, would say that the air gage has possibly been added and used as a substitute for the oil gage which came with the car, and if it reads about the same pounds per square inch, it does not make any difference which one is used.

On this model of Dodge car there should be no external pump required. Inside of the engine at the front there is a pump which carries oil from the reservoir to a pipe which runs along the engine in the upper right-hand corner of the crankcase. This oil pipe feeds lubrication to the camshaft bearings and from these bearings the oil runs down through channels cast in the crankcase to the main bearings while additional jets of oil spurt from the oil pipe to the troughs into which the lower end of the connecting rod splash.

For this reason it will be seen that no pipe running to the main bearings would be visible, as this is all taken care of inside the engine. The only thing visible will be a pipe coming from the bottom of the engine around to the upper part of the crankcase at the right side up toward the front and from a Tee connection there will be one pipe coming back to the oil gage. Aside from this no external oil lines will be seen. The addition of a pump has perhaps been made by someone unfamiliar with the system, for under ordinary circumstances no such pump should be required.

1917 Mitchell Starter and Generator

Q—We have a 1917 Mitchell on which the generator and cutout have never worked properly, and would like to have a diagram, also instructions for checking up the generator system.—C. M. Kellogg & Son, Barnes, N. Y.

1—According to the Chicago distributor for Mitchell cars the 1917 model was equipped with Westinghouse starting and lighting systems and on page 76 of the April 6 issue of MOTOR AGE there was shown at the bottom of the page a wiring diagram which is correct for the starting and generating part of the Mitchell car. One common trouble experienced on this generator was due to the fact that the brushes have to be put in in a certain way in order to make contact with the commutator.

When these are removed from the generator it will be noticed that at the top of the carbon part of the brush itself is a circular metal plate having a notch in one edge. Inside of the brush holder there is a sort of rib which engages with this notch and keeps the brush from turning.

The average electrician not acquainted with this construction will nine times out of ten put one of the brushes in the wrong way and the notch in the brush not lining up with the rib in the brush holder will, of course, prevent the brush from going in properly and while it is possible to push it in and force the cap on, the brush is really not touching the commutator and, of course, the generator will not generate. When the brush is properly installed it can be moved in and out of the brush holder with a slight tapping sound as the brush hits the commutator and the sheet metal cap at the outer end of the brush spring will only be about ⅜ of an inch out from the brush holder so that only slight amount of compression of the spring is required in order to put the brush cap on.

At this point another trick will facilitate the proper installation. This is to turn the brush cap three or four times in the wrong direction that is, left hand and then turn them three or four in the right direction. This has the effect of twisting the brush pigtail first the wrong way and then the right way so that when finally installed it is not wound up so as to hold the brush off the commutator.

The cutout mounted on the dash is really a combination regulator and cutout and with the cover removed it will be seen that there is a pair of contacts at the left which are supposed to vibrate to control the output of the machine while another pair of contacts at the right are normally opened with the engine standing still but closed when the engine runs to allow the generator to charge the battery.

The condition of the contacts at the left is sometimes such as to prevent the generator operating and it is sometimes advisable to take a thin magneto contact file and run it through these regulating contacts at the left so as to clean them up.

Another condition which will affect the operation of the regulator is a tight pivot. The adjustment of the pivot should be such that with the adjusting screw at the right backed off, that is, screwed up a ways the regulating contact at the left will be able to fall by its own weight when pushed upward against the other contact but there should not be a great deal of side play to the vibrating arm.

If an attempt is made to change the adjustment of this pivot screw care should be taken to first loosen the lock nut as if this is not done there is great danger of breaking the screw off. The generator circuits can be checked by operating the cutout points at the right of the regulator and observing the reading on the ammeter. It will be noticed that the regulator has three terminals which are marked "A" which stands for armature, "F" which stands for field and "B" which stands for battery and in testing the circuits it might be well to disconnect the "F" wire so as to test the armature circuit only.

With the "F" wire disconnected the cutout points at the right of the regulator should be closed and this should cause about 15 amperes to flow through the armature from the battery which current can be observed on the ammeter. While the cutout points are held closed the vibrating contact to the left should be opened and closed and this should have absolutely no effect on the ammeter reading. The "F" wire can now be replaced and the "A" wire removed and the test repeated. The reading on the ammeter should now be about two amperes with the vibrating contact to the left closed and a barely perceptible reading if the contacts are open. If the results are not as above indicated and the operation of the regulating contact at the left affects the heavy 15 ampere current, then it is a practically certain indication that the wires are reversed, the "F" wire on the regulator going to the "A" terminal of the generator and the "A" terminal of the regulator going to the "F" terminal on the generator. This can be corrected, of course, by reversing the wires at either place.

With the circuits substantially correct both the vibrating contacts at the left of the regulator and the cutout points at the right should be closed which will draw from 15 to 20 amperes discharge on the ammeter. The engine should now be started and this discharge current should rapidly become a charging current on the other side of the ammeter. If it comes up to about zero, however, it would indicate armature trouble while if it stays at 15 or 20 amperes discharge it would probably indicate an open field circuit. An opened field circuit could not be encountered at this point in the test, however, if a previous reading of 2 amperes had been obtained, as suggested in the foregoing test.

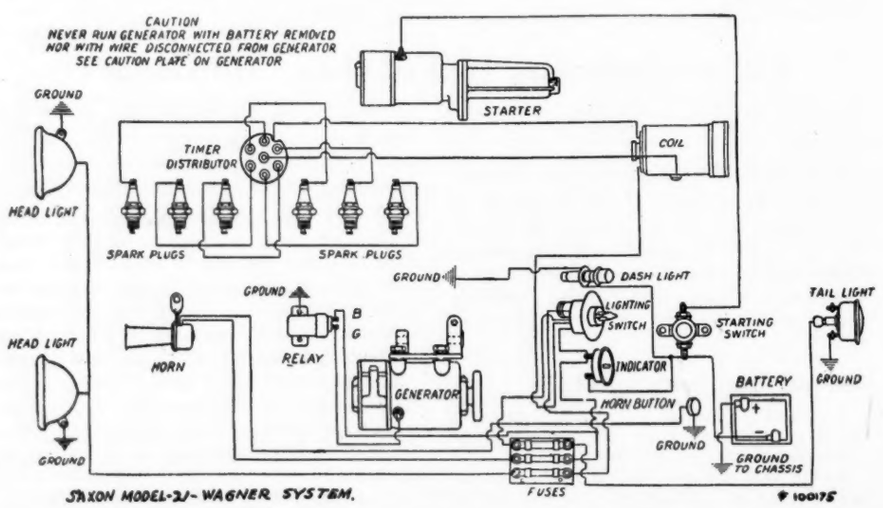
If the generator will charge 15 to 20 amperes with vibrating contacts held together it shows that the generator is all right and the next test should be to adjust the regulator by turning down the adjusting screw at the right side so as to cause the points at the left to be held more tightly together.

These should be adjusted to give approximately 12 amperes charge for ordinary service, from 12 to 15 amperes being about right for a discharged battery. If the battery is not in a discharged condition this can be imitated by temporarily operating the starter and then quickly starting the engine and noting the highest readings on the ammeter. The charging current is increased by screwing down on the adjustment and is reduced by backing off the adjusting screw.

WIRING DIAGRAM OF 1921 SAXON

Q—Give wiring diagram of 1921 Saxon. —Ocean Edge Auto Repair Works, New Dorp, S. I., New York.

1—Diagram requested is shown below:



Adjusting Pinion Shaft

Q—Explain how to adjust pinion shaft in or out on 1918 five-passenger Auburn rear axle.—William J. Burnett, Greenwood, S. C.

1—Before adjusting the pinion shaft, it would be advisable to test the pinion shaft bearings for adjustment. These bearings should not be adjusted unless they are loose; that is, when you can move the shaft forward or backward. You can determine the amount of play or looseness by applying pressure with a chisel behind the locknut E and the side of the chisel against the end of the carrier, also by tapping with a wooden mallet against the companion flange of the universal joint or by grasping the propeller shaft with both hands and shaking.

If it develops these bearings require adjustment, and this may be necessary after running the first several thousand miles, proceed with caution and avoid a too tight adjustment, which will cause excessive heating and a subsequent destruction of the bearings and gears.

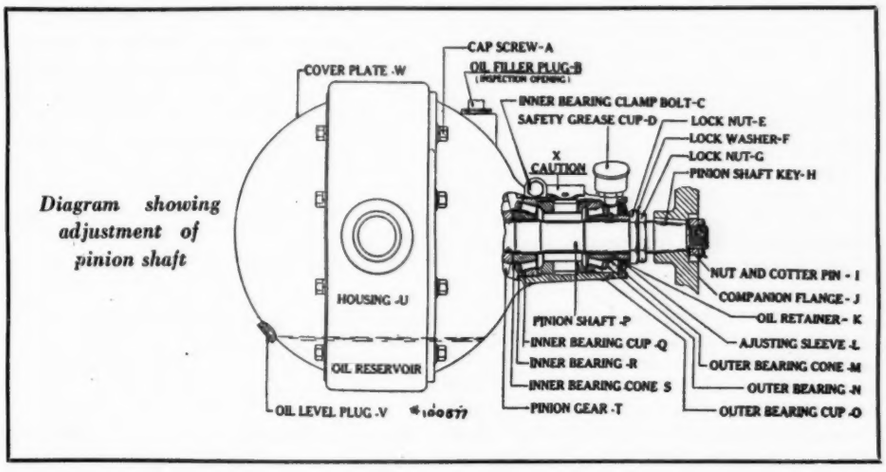


Diagram showing adjustment of pinion shaft

To adjust the pinion shaft bearings, first unlock the nuts "E" and "G" by straightening the lock washer F, the edge of which is turned or bent over the flat of each nut. Back off the nut G and lock washer F as far as possible. Turn the inner nut E in a clockwise direction to a snug but not strained tightness, then back off a sixth turn.

Now again test the adjustment of the end play by the methods mentioned; be sure that adjustment is correct before locking, then tighten up the outer nut G and be sure to bend the lock washer over each nut so as to lock the adjustment. Be careful not to strip the tongue off of the lock washer.

Do not attempt to hold the pinion shaft T from turning by using a wrench on the lock nut G or E when assembling the companion flange J onto the tapered end of the pinion shaft T. If you do this, you may strip the locking tongue on the washer F, which fits into the keyway.

This would permit the nuts G and E to turn and thus tighten up the pinion bearings. The proper way to assemble this companion flange on to the pinion shaft is to first slip the key and flange on the shaft and drive to a snug fit with a soft hammer. Then start the nut on the shaft and screw it up to refusal onto the flange J by using a spanner wrench engaged in the holes on the back side of the flange J. Be sure to lock this nut with a cotter pin as shown.

If after the pinion shaft bearings have been adjusted you decide that adjustment is necessary to the pinion in order to secure quiet operation of the gears, you should proceed in accordance with the following instructions. Loosen the clamp bolt nut C and hit the head of this bolt several times with a wrench or hammer to be sure that the bearing cap Q is free. Next remove the pinion adjuster lock X and, using a small bar, turn the adjuster to the right if you desire to move the pinion gear forward, or to the left if you desire to move the pinion gear backward, that is toward the rear of the vehicle. This brings the back part of the pinion gear and ring gear to proper position desired. Now tighten up the clamp bolt nut C, pour good clean oil through the holes in the adjuster onto the pinion bearings, then replace the adjuster lock X and run the car around the block in high gear. If objectionable noise has been eliminated, make no further adjustment, but if the excess noise is still in repeat the adjustment described above, but move the adjuster only one or two notches in one direction or the other until quieted running position has been secured. Never run the vehicle without first tightening up the clamp bolt C and locking the adjuster Y with the adjuster lock X. Do not attempt to test the adjustment by running the axle on the jack, because an axle road test is necessary after each adjustment.

Armature Winding Diagram Discussion

Q—We would like a little more explanation in regard to the Ford generator armature winding diagram which appeared on page 39 of the March 30, issue of Motor Age. What is meant by coil pitch 1 and 6? Also what is meant by coil per slot and turn per coil?

2—Which way do you wind right hand or left hand?

1 and 2—In numbering the slots of an armature it is held with the commutator towards you and any slot is considered number one and the numbers go around to the right. After the slots have been numbered coil pitch one and six means that in winding a coil the winding goes over away from the commutator in the slot number 1 and comes back in slot number six, then over in number one and back in number six until nine turns have been put in this one coil.

In gears the word pitch is used to describe the distance from one tooth to the other while in coils it describes the distance from one side of the coil to the other which in this case is from slot number one to slot number six. The coil per slot term means that there is one side of one coil and the other side of another coil in each slot, in other words 18 wires or an average of one coil per slot. If we wish to be more exact about it we might say two half coils per slot. In the diagram the winding is shown as going right hand, that is over in slot number one and back in number six.

Meaning of Numbers

3—At the bottom of the sketch it shows 1 and 12 R what does this mean?

3—The descriptive marking one and 12 R refers to the bars into which the ends of one coil are fastened.

Locating Commutator Bar

4—Where is number 1 on the armature?

4—Number one commutator bar in this diagram is supposed to be in line with the slot number six.

Amount of Wire Needed

5—How many feet of wire would be needed to wind this?—Wallace Wood, Edgerton, Ind.

5—Information as to the exact length of wire required is not available, but you could estimate it if you cared to by measuring the approximate length from bar number 13 over slot number one and back to slot number six and around nine times and back to bar number three. This length multiplied by 21 the number of coils would give the approximate length of wire required. In connection with this diagram we have also had a call from the Ford assembly plant in Chicago and they advise that the armature is now being put out or connected from one to 11 instead of one to 12.

The difference is that one of these armatures would rotate clockwise and the other counter-clockwise. This would have no very great effect however, as any change in rotation could be corrected by reversing the field connections which go to the third brush and the grounded main brush. The generator should rotate clockwise from the driving end and if it rotates in a counter clockwise direction this reversal of the field connection should be made.

WEIGHT OF MARMON

Q—Give me the weight of a Marmon standard 34 chassis without body.—D. W. Van Orsdol, St. Paul, Minn.

1—The net weight of the Marmon chassis without body is 3,410 pounds.

DESCRIPTION OF FRONTY-FORDS AT INDIANAPOLIS

Q—Where could I obtain the exact mechanical specifications of the Fronty Fords that were raced at Indianapolis Memorial Day?

1—The exact specifications of the Fronty Ford cars can be secured from Chevrolet Brothers Mfg. Co., Indianapolis, Ind. We are printing herewith specifications as supplied by that company for publication.

Cylinder Block—Standard Ford.
Cylinder Head — Frontenac 8 valve Model R.
Crank-Case—Standard Ford.
Crank-shaft — Special counterbalanced, drilled for oil pressure system.
Cam-shaft—Standard Ford.
Pistons—Walker-Leavitt Magnalite.
Connecting rods—Standard Ford.
Transmission—Standard Ford.
Rear Axle—Standard Ford with 3 to 1 gear ratio and sleeves pressed in outer ends of axle tubes, machined to receive ND No. 309 annular ball bearings.
Front Axle—Standard Stan-Par. 1 Beam.
Front Spring—Semi-elliptic parallel with frame.
Cooling—Special Fronty-Ford water pump and Fedders radiator.
Oiling — Sub-base attached to lower crankcase, oil circulated by gear pump attached to front end of Camshaft forced at 75 lbs. pressure to main bearings of crankshaft which are drilled through to connecting rod bearings.
Ignition—Delco magneto replacement battery ignition carried on special Fronty-Ford bracket.
Wheels—Wire wheels made by Dayton Wire Wheel Co., size 28x4 with center of rim depressed to allow use of straight side tires without use of locking rings.
Tires—28x4 Dayton Tire & Rubber Mfg. Co. Special Racing Cord Straight Side.

2—What was the approximate r. p. m. maximum?—Rae Hudson, Arkansas City, Kansas.

2—The Fronty Ford racers qualified at approximately 84 m. p. h. for the 10 miles on the speedway which is 4 laps. To maintain an average speed of 84 m. p. h. required an average engine speed of approximately 3,220 r. p. m. It is stated that the maximum revolutions of this engine are approximately 3700.

FORD GENERATOR ENGINE DRIVEN FOR BATTERY CHARGING

Q—We have a 1½ horsepower gas engine and a Ford generator that we wish to use for charging batteries. Give diameter of pulley to use and wiring diagrams for this work.—C. B. Norris, Willow Shade, Ky.

1—In Fig. 1 is given wiring diagram also arrangement of engine and generator showing the pulley and belt used for driving. The Ford generator should be run at about 1,500 r.p.m. and as the engine will probably run slower than this, it will be necessary to have a larger pulley on the engine than on the generator. For example, if the engine should run 500 r.p.m., this pulley would have to be three times the size of the generator pulley. If the engine runs 750 r.p.m., this pulley needs to be twice the diameter of the generator pulley.

The generator will be suitable for charging 6-volt batteries only and usually will take care of but one at a time, as the greatest current obtainable from

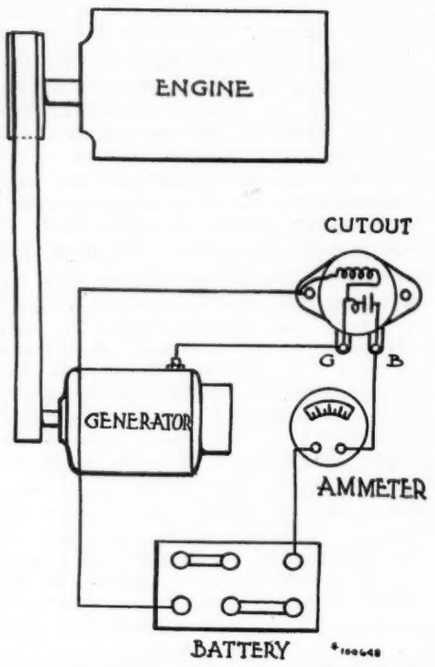


Fig. 1—Charging Batteries With Engine and a Ford Generator

the generator without overheating it is 10 or 12 amperes. It does not make any difference which way the battery is connected if before starting up the engine a screwdriver blade is temporarily used to short the G and B terminals of the cutout which will magnetize the generator the right way for charging the battery.

Connecting the batteries in different ways, however, will make the ammeter read first one way and then the other way when charging. Increase in the ammeter indication as the engine speed increases shows that the current is a charge current and not a discharge current. If it is desirable to charge two batteries each at five or six amperes they can be connected side by side, that is the two plus terminals connected together and the two minus terminals connected together. Then from the plus terminal a wire can be connected to the ammeter and from the negative terminal to the frame of the generator.

KEETON WIRING DIAGRAM

Q—Publish wiring diagram of the Keeton car which used Jesco starting and lighting system.

1—The diagram requested is shown below.

Motor Generator for Starting Only

2—Can we use this motor-generator for a starting motor only, using other parts for the rest of the electrical system?

2—The motor generator in the diagram is designed to operate on 16 volts when acting as a starter and on eight volts when generating, the controller operating to put the two parts of the battery first in series and then in parallel with each other. For this reason if the machine is used as a starter only the controller would be dispensed with and the two heavy leads from the machine to the controller would be used in connection with a separate starting switch and a 16-volt battery.

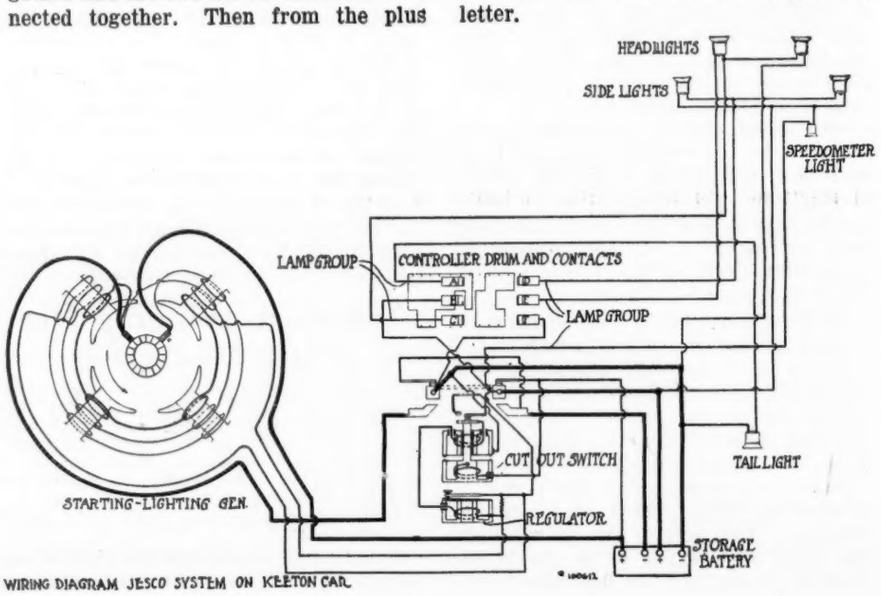
It would of course be necessary to install a separate generator in order to keep the battery charged and the difficult part of the installation would be to find a suitable generator. It is very easy to pick up 6-volt generators, the Ford being very suitable. It is also possible to get 12-volt generators, but we do not know of any generator which is exactly right for 16 volts.

It would of course be possible to rewind a Ford generator or some other type to be approximately correct for 16 volts and information in this regard could be given if we were advised as to the type of generator to be used.

Race Car Picture

3—We recall that Bob Burman drove a Keeton car in one of the Indianapolis 500-mile races. We would like to get a picture of this car if possible.—W. T. Scott, San Antonio, Tex.

3—This information will be given by letter.



WIRING DIAGRAM JESCO SYSTEM ON KEETON CAR.

Cause of Knock After Taking Up Bearings

Q—We are having trouble with a number of Buicks in this territory which show a knock from 22 to 27 miles per hour after having been fitted with new piston pins and after having had all the bearings taken up. At some times the use of the choker will diminish this knock and at other times seems to have no effect. The position of the spark lever also does not affect this condition. This trouble is being experienced on five or six cars, some of these being model K and others are one or two yars older.—J. O. Werner, Farnhamville, Ia.

1—By the time that it is necessary to take up the main bearings it is also natural that there will be some wear in the front camshaft bearing and pump shaft, these being bronze bushings. When the main bearings are taken up it has the effect of slightly raising the crankshaft which causes the timing gears to mesh tighter than they did before.

In previous running from the time the car was new until the taking up of bearings was necessary, the steel timing gears in running together would form slight ridges in the surfaces of the teeth, then when the bearings are taken up and the teeth meshed more tightly, the ends of the teeth strike the ridges in the face of the other teeth which causes the knock experienced.

The remedy is to install new timing gears, preferably using the fiber ones which can be obtained through authorized Buick service stations and also to install new bushings on the pumpshaft and camshaft. It is, of course, also possible that there may be other reasons for the knock experienced.

If it were not for the likelihood of the conditions above described, we would feel that the fuel knock would possibly be the cause of the trouble. This is aggravated by a lean mixture and is sometimes reduced in violence by using the choker or adjusting the carbureter to give a richer mixture.

REO AND DODGE FACTORY VALVE TIMING

Q—Give instructions for timing valves on 1917 Reo.

1—To check the valve setting, first open the compression relief cocks over the exhaust valves to allow the motor to be turned over easily. Taking any desired cylinder as No. 1, crank the engine slowly with a hand crank until the exhaust valve of this cylinder lifts and starts to drop again. Still turning the crank very slowly, determine the exact point at which the exhaust valve is completely closed.

This can be determined by turning the valve spring seat which will turn the valve stem until the moment of closing when the friction of the valve on its seat prevents the turning of the stem. At this moment the marks "EC" on the flywheel should not be more than ½ in. either way from the reference point on cylinder No. 4, which is a small prick punch mark located on the side of No. 4 cylinder the one next to the dash. If this checks for one cylinder it will not be necessary to check it for the other cylinders as the camshaft is accurately ground and the cams are in correct relation to each other.

Cam gear setting. The flywheel on this motor is of such a diameter as to require its turning through an angle of approximately 7 degs. to produce one inch movement of its face with respect to some fixed point. Now since the error in cam setting must not exceed ½ in. which is equivalent to 3½ degs. movement of flywheel or crankshaft or if for any reason valve openings or closings are not within this limit, the setting may be corrected in the following manner:

Cam gear having 54 teeth would rotate 360 divided by 54 degs. if shifted one tooth, this being equivalent to 6 2/3 degs. on camshaft, which is equivalent to twice this amount of 13 1/3 degs. on crankshaft and flywheel. Now since one inch on flywheel is equivalent to 7 degs., this will give 1 9/10 in. movement of flywheel.

Now you will see that if the cam openings are off just two inches it will be easy to shift the cam gear one tooth in the direction required and have an error of only 1/10 in., which would be close setting. If, however, the error of camshaft was but one inch, it would be impossible to get nearer than 9/10 in. by shifting this gear one tooth, which is in excess of the limit desired. Means therefore have been provided for correcting this.

The cam gear as above stated has 54 teeth and is held to the camshaft by four equally spaced holes. If you will divide the number of teeth by four we will have just 13½ teeth or ¼ revolution of gear. Now if we unlock gear from the camshaft and shift just ¼ revolution we will have changed their relative position of the teeth to camshaft just ½ tooth, this being equivalent to 9 /10 in. movement of flywheel, giving a method whereby the greatest variation of camshaft setting may never exceed ½ in. measured on the flywheel.

Timing Valves on Dodge

2—Give instructions for timing valves on 1919 Dodge.

2—The exhaust valve should just close on the Dodge engine when the piston is 8 degs. past upper dead center. Measured on the flywheel, this 8 degs. would equal 1.08 in. on the disc clutch flywheel and 1.13 in. on the cone clutch flywheel. The intake opens 2 degs. after the exhaust has closed.

Testing Ford Magnets

3—When is it necessary to charge Ford Magnets? By this I mean how can you tell when they need charging?

3—Ford magnets should be charged when they show signs of weakening which can be detected by the condition of the ignition system in general or by means of a meter strictly adapted for testing this magneto. The value of the voltage of the Ford magneto should be 18 to 20 volts at medium engine speeds and a maximum of 30 volts at high speeds.

4—Where can I purchase spiral differential gears for 1917 Grand model K?

4—Spiral differential gears can be secured from the makers of the axle, the Peru Auto Parts Company, Peru, Ind.

5—Is it possible to charge Fordson magnets in the same way that the Ford magnets are charged?—E. D. Buckove, Therma, New Mexico.

5—Yes.

NORTH EAST MOTOR GENERATOR ON DODGE CUTS OUT TOO SOON

Q—We have a peculiar case of trouble in a model G Northeast generator used on a Dodge car. This generator is apparently in good condition and will charge 10 amperes, but as soon as the car attains a speed of 10 m. p. h. the generator cuts out. Advise what you think the trouble might be.—Crowell Motor Co., Union City, Tenn.

The nature of the trouble appears to be in either a loose connection, an intermittent short in the armature, or due to an eccentric commutator. If you have the generator on the car would suggest that you run it up to the speed where it cuts out and, with the commutator cover removed, apply pressure with the fingers to the three brushes. If this seems to correct the trouble up to a somewhat higher speed, it is no doubt that an eccentric commutator is to blame. The remedy would be to carefully center the armature with respect to the bearings and then turn the commutator.

It is recommended that this large armature be turned on its own bearings which is no doubt ideal from a theoretical standpoint, but somewhat difficult from a machinist standpoint. If the generator is on the car, you might also connect a voltmeter from the live terminal to the frame of the car and observe what voltage you get when the generator stops charging at 10 m. p. h. If the voltage would suddenly jump up, it would show that the trouble was not in the generator but due, perhaps, to vibration, breaking a circuit in the cut-out which is combined with the starting switch on the toeboard.

On the other hand, if the voltage would suddenly drop as the generator cuts out, it would show the fault to be in the generator itself. Another possibility is that some of the leads are poorly soldered and this can be determined by pulling on all of them to see if they come out of their terminals.

Another possibility is that there is a short in the armature which only shows up when centrifugal force puts a strain on the armature conductors.

To test for this the field fuse should be removed and a voltmeter connected from the main terminal to the frame of the car. It will read the voltage generated on residual magnetism which should increase in proportion to the speed of the engine. If as the engine speed is increased the voltage goes up for a while and then suddenly drops off or wavers, it shows the trouble to be either in the armature or brushes and if holding the brushes firmly on the commutator does not correct the wavering condition of the voltmeter needle, then a new armature should be tried if possible. Would also suggest your looking for a loose fuse connection and would suggest sandpapering the ends of the fuse, also the clips to which it makes contact.

The ACCESSORY SHOW CASE

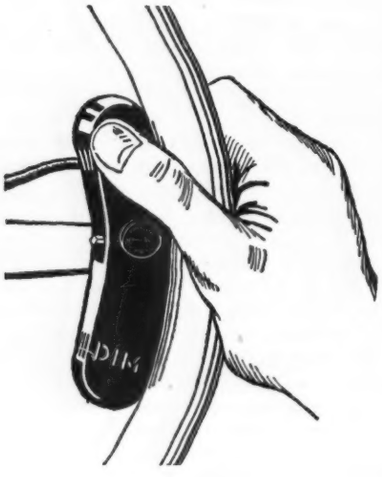
New Sources of Retail Profit

F. R. M. TIMER

The F. R. M. Timer is new in design and is built complete with all wires enclosed, $3.50. F. R. M. Timer Mfg. Co., Fairbury, Ill.

TEST-O-CAP

This is a combined dust cap and tire gage. When the plunger in the top is pressed if the cap rises at all the tire is properly inflated. If arrow point on cap rises above bottom edge of red band the tire is over-inflated. $6 per set of four. Greist Mfg. Co., New Haven, Conn.

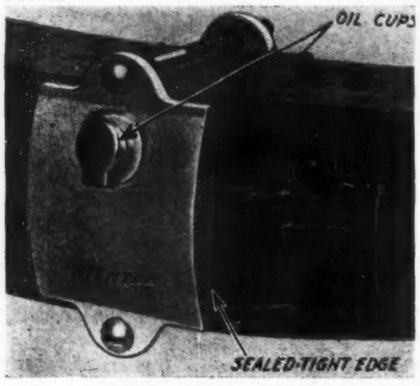


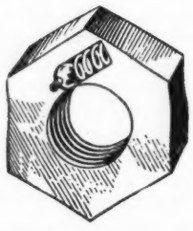
ROXWITCH

Roxwitch is attached to the steering wheel and brings horn and lights under thumb control. Price, $3.85. Patton-MacGuyler Co., Providence, R. I.

JARMIE AUTOMATIC SPRING LUBRICATOR

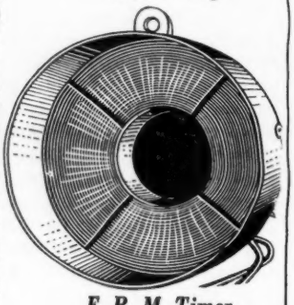
This lubricator is fastened around the springs as shown in the cut and oil cups are maintained at front and rear into which oil is put to reach the leaves. Jarmie's Mfg. Co., New Haven, Conn.





Self locking nut

Test O Cap

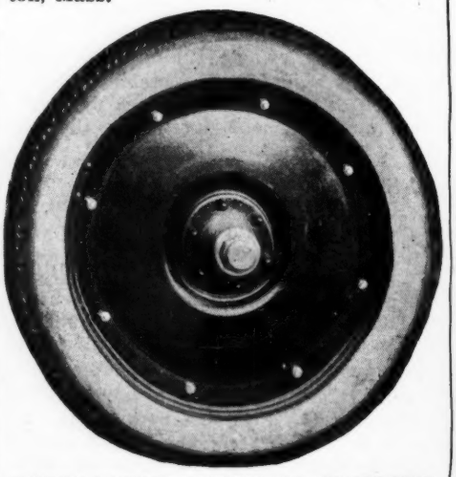


F. R. M. Timer

C & S tire pumps

C AND S AUTOMOBILE PUMPS

C. & S. Automobile Pumps, come in various sizes for use on the road or in the garage. Two models are made with stirrup bottom, into which the foot fits and holds the pump secure while inflating a tire. Prices $4.75 to $6. Codman and Shurtleff, Inc., 535 Albany St., Boston, Mass.



PARAGON DISK WHEELS FOR FORDS

Paragon Disk Wheels for Fords are sold at $50 per set. They are equipped with demountable rims and standard hubs. Wilkinson Bros., Portland, Ore.

SELF-LOCKING NUT

The Auto Accessory Sales Co., 208 Empire Bldg., Detroit, Mich., has brought out a self-locking nut. The locking feature of the nut, as shown in the illustration, is a small steel ball, encased in an opening in the nut which, when screwed on to the desired fit, locks by means of a spring release.

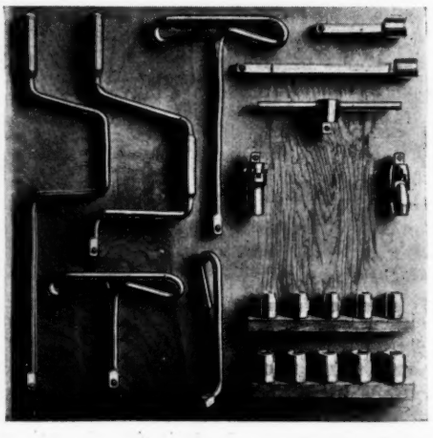
To remove nut, a small nail inserted in the opening will release the ball.

IMPROVED RUNNINGBOARD SET

This cabinet attaches to the runningboard and has three compartments, one for gasoline, oil and water. Each compartment is constructed of heavy steel and encased in a baked black enamel holder. Woolwine Metal Products Co., Los Angeles, Calif.

SNAP-ON INTERCHANGEABLE SOCKET WRENCHES

A complete set of socket wrenches for all cars at from $5 to $15.25 depending upon the car. The set is shown in the illustration. Motor Tool Specialties Co., Chicago.



Sales Maintained in Most Cities

Correspondents' Reports From Many Points Show No Decline

Volume Has Dropped Slightly in Scattered Sections, But Increases in Others

REPORTS received by MOTOR AGE at the end of June from correspondents in many cities show that retail sales of automobiles are keeping up remarkably well into the summer and in some places still increasing. Only a few cities report a falling off, which in every case is slight. The prospect for July sales is generally said to be optimistic. The dispatches from correspondents are printed on this page.

BERKELEY, Cal., June 30—Retail automobile sales are keeping up with last month. Sales of Fords and medium priced cars are best.

FORT WAYNE, Ind., June 30—Business has taken a spurt in this locality. Dealers in popular priced cars state that they cannot get enough cars to supply demands. Deliveries on certain models, particularly sedans, are not guaranteed under a month. Not only are the dealers experiencing greatly increased business, but all the manufacturers turning out automotive equipment are also feeling the same spurt.

SPOKANE, Wash., June 30—No material reduction in retail sales. Many firms will establish new high retail records this year while others will be hampered because of the inability of their factories to supply the demand. Lower price cars are doing land office business. The president of the Spokane Automobile Chamber of Commerce expects the heavy retail sales to continue during July.

LOUISVILLE, Ky., June 30—Automobile sales are keeping up the high mark set in April and May, according to a report issued today by the Louisville Automobile Dealers Association.

Sales for the first five days of last week amounted to 364 cars, of which 143 are new cars and 221 were used cars. This period is in excess of any week yet established this season, although it counts sales for only five days. With the probable sales of Saturday included, the total will no doubt exceed 400 for the week, which is 12 per cent more than any week of the season.

MILWAUKEE, June 30—Dealers say that the retail demand is more spotted. They have skimmed the cream of prospects, but the June volume nearly equals May which was the heaviest month. A seasonal decline is looked for in July and August, but no marked slump is expected.

ST. LOUIS, June 30—Retail automobile sales are holding up remarkably well and June will be as big as April and May for most dealers. A decline is expected in July.

PHILADELPHIA, June 30—Automobile sales are holding up fairly well. No decline as yet. Used cars are selling well.

DETROIT, June 30—Retail buying in the Detroit district is declared by dealers to be normal for this time of the year, not as good as earlier in the spring and tapering off with the approach of summer months. Deliveries on standard lines of cars are still from two to six weeks behind, but are expected to be fully caught up on all models by Aug. 1. Sales of used cars have slowed down considerably since June 1 and a number of dealers have declined to accept any more cars in trade. Used car prices are high. Summer months will witness a special effort to clean out used stocks in preparation for fall business. Dealers will open the fall season with an enclosed car show which is expected to line up a large volume of business for the fall months.

LOS ANGELELS, June 30—Such cars as Ford, Chevrolet, Dodge, Buick, Studebaker and other makes of corresponding prices show an increase in sales. Packard single six and Cadillac continue to gain. Other high price makes are running behind last year's business. Registrations for June undoubtedly will be larger than the same month a year ago, but it may not equal May.

BUFFALO, June 30—Retail automobile sales in this city have shown no sign of falling off, according to information obtained today from Secretary C. C. Proctor of the Buffalo Automobile Dealers Association. "The retail business during June," he said, "was easily 100 per cent better than in the corresponding month of last year. The same thing is true with reference to the business done by Buffalo's automobile retailers during May of this year and their business in April was at least 45 per cent better than in April, 1921. A number of the dealers here report trouble in getting enough cars to meet the demand.

KANSAS CITY, Mo., June 30—Motor car dealers almost unanimously say that sales of passenger cars have been better the past week than any time this year, and that June has been a good month. This is true both of firms selling high priced cars and those selling low priced cars. Special conditions have helped some firms to build a really important volume of business in the past two or three weeks, such as announcements of new models and the entrance of new firms into the distribution, and the extraordinary efforts at publicity and selling that accompany such changes. But both for those who have these special reasons for expecting increasing trade, and for the old established companies, the volume has been steadily growing in June. General conditions are largely responsible, with a bountiful wheat harvest in process of gathering and corn lookng fine, and money already flowing more freely from the agricultural districts.

CHICAGO, June 30—Retail sale of automobiles in Chicago continue at a high volume. Taken week by week, there has been some fluctuation through June. Sales for the week ending June 24 fell somewhat below sales for the preceding week. This week, however, shows unusual activity in virtually all lines and it appears that the total for the week is likely to exceed any week this year. Some dealers are having a number of cancellations because of their inability to make deliveries.

Denver, June 30—Although some dealers report that there is a beginning of a slight sales decline and expect moderate trade in July, June far surpasses May and also last June, and some say it is the best month in two years or more. New car sales are holding stronger than used cars and July is predicted to exceed last July.

DES MOINES, Iowa, June 30—Any change in retail conditions noticeable is toward slackening, but it is very slight and applies only to cities and larger towns. The farmer and small town business is showing signs of improvement.

ATLANTA, Ga., July 3—Atlanta dealers and distributors advise that sales during the last two weeks of June fell off somewhat as compared with the first half of the month, but that business as a whole continues entirely satisfactory as compared with the same period of a year ago. Registrations in Atlanta of new and used passenger cars and trucks the week ending June 24, was 175, or about 50 less than the previous week.

DETROIT, June 29—Announcement is made by Alvan Macauley that a production schedule of 2,000 Packard single six cars a month has been determined upon, in addition to the twin six and truck output. This schedule would make the production exactly twice the volume decided upon when the new single six was announced in April.

New Policy of Cleveland Dealers' Association Brings Worthwhile Results

Improvement in Maintenance Conditions, Used Car Market and Help Situation Follows Employment of Full-Time Secretary

THE Cleveland Automobile Manufacturers and Dealers' Association has been setting a pace in business betterment since the first of June that is an example for other trade organizations, and has given dealers and makers a new insight into just what can be accomplished when all in a certain line get together and pull together.

The association is one of the oldest and best established in the city, but for years it was not active in dealing with the problems that arise to confront those in various lines of the automobile industry. The organization's activity was limited largely to that of staging the annual automobile show, and it always performed excellently in that respect. Permanent offices were never maintained until the first of June this year. Neither was a paid secretary on the job continually until June 1.

An All Year Secretary

Herbert Buckman, for years assistant secretary of the Cleveland Automobile Club, editor of the Ohio Motorist, and active in promoting automobile shows, became the first paid and all-year-round secretary of the association June 1. He immediately opened headquarters in the Stuyvesant building in Euclid avenue, and started the wheels to going round. Once started, slowly, they gained in momentum until now Buckman has about all he can do to attend to committee meetings, round table discussions, lectures and other activities that have been launched.

The organization of departments was one of the first undertakings. The service managers now have a department of their own and they meet every two weeks for the discussion of their problems. The men meet in the absence of their bosses, which is quite a new experience to them, and they manage to get out of their system some things that they wouldn't in the presence of the boss.

The discount problem has been a bothersome one in this city for years. The men tackled that first. A service manager can go into a half dozen different service stations for parts and accessories and get as many different discounts on purchases. In fact he can go into some stations and not get a discount. This has put some managers at a disadvantage in figuring the costs of repair jobs that are brought into their establishments.

The service managers are soon to put into effect a uniform system of discounts and they never would have been able to accomplish this had they not had the influence of the association behind them.

Acting under instruction of the directors, Buckman is now engaged in making a survey of the used car situations in the leading cities of the United States and Canada.

One of the pernicious activities in the used car market that the association is particularly driving at is that of overbidding. It has come to the point in this city where many dealers do not sell new cars, they simply outbid their competitors on trade-ins.

In one instance, the owner of a used car desired to trade it in. At one place he was offered $350. The owner liked the new car that was distributed at this store and he preferred it to the car he eventually purchased. But he went into another dealer's place where he was offered $450 for the old car on a trade in. He accepted it and today is driving a second choice car around.

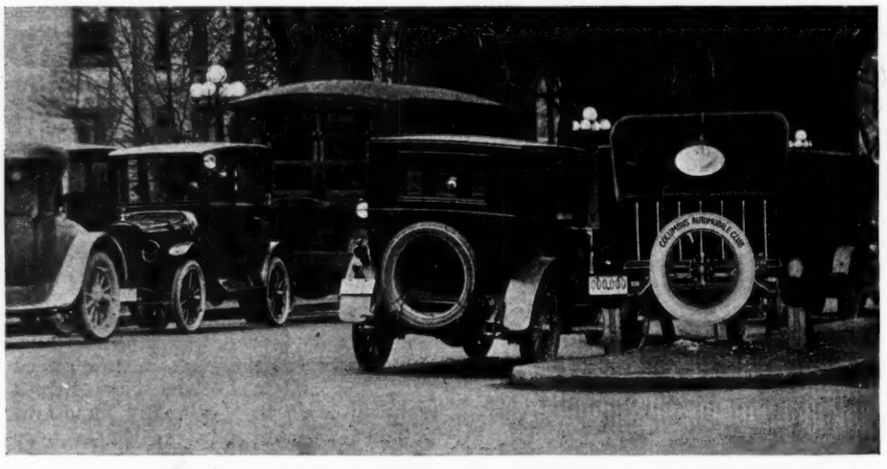
Employment Service

The service managers also have used the association to get competent help. There is nothing that gets on the nerves of an efficient service manager as the sight of an incompetent and sluggardly mechanic at work on the delicate and intricate machinery of the automobile. Now when a man applies for a job, he is asked where he worked in Cleveland. Each service manager is pledged to phone each reference before putting the applicant to work, and the manager given as reference is pledged to give full information.

Stopping a Nuisance

The special edition solicitors and fund workers have been hitting the cash registers of dealers and distributors quite heavily in recent years and the Association has solved this problem by distributing to its members printed cards that are to be handed to solicitors. This card stated that all advertising propositions have to be referred to association headquarters. Buckman has always been noted for his ability to turn down such appeals.

Meetings of the associations have been held weekly and the attendance has grown steadily. Different concerns offer entertainment at their cafes and so popular are these meetings and entertainments that the organization is booked ahead for 6 weeks.



Novel Warning Sign Prevents Accidents

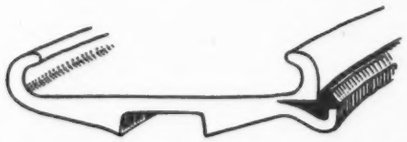
COLUMBUS, O., June 26—As a last resource to prevent the frequent automobile accidents which had been occurring at the beginning of parked strips in East Broad street, a leading thoroughfare of Columbus, a member of the Columbus Automobile Club conceived the idea of building a sign which looks exactly like the rear of an automobile for a warning.

Since this has been done the accidents have virtually stopped. Apparently, this seems to prove that motorists pay little attention to the ordinary signs of warning, but when they see the rear of another car they intuitively put on the brakes and take care. This end of the parked strip, which contains a number of trees, was the scene of a number of very serious accidents before the novel warning was posted. The presence of the strips is explained by the fact that at this point the street begins to be divided into three different roadways.

TIRES, RIMS AND WHEELS FOR 1921 CARS

Motor Age Maintenance Data Sheet No. 177

IN THE data presented the tire sizes given are standard. The oversize tire dimensions easily can be computed by adding ½ in. to the cross section of the tire and adding 1 in. to the diameter. Thus the oversize tire for a standard 33 by 4 in. tire would be one with a cross section of 4½ in. and diameter of 34 in. In other words, a 34 by 4½ in. tire will fit the same rims as used with a 33 by 4 in. tire.

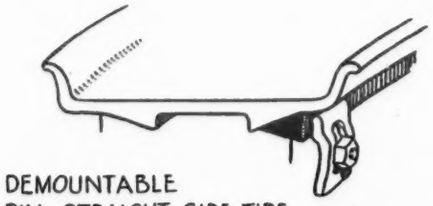


QUICK DETACHABLE & DEMOUNTABLE

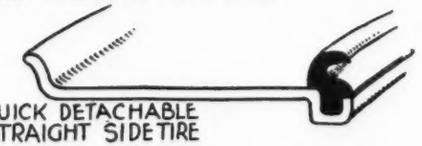
ONE PIECE CLINCHER

Standard Oversize Tires

Standard Size	Oversize to Fit Same Rim
28 by 3	28 by 2¼
28 by 3	29 by 3½
30 by 3	30 by 3¼
30 by 3	31 by 3½
32 by 3	33 by 3½
34 by 3	35 by 3½
36 by 3	37 by 3½
30 by 3½	31 by 4
32 by 3½	33 by 4
34 by 3½	35 by 4
36 by 3½	37 by 4
32 by 4	33 by 4½
34 by 4	35 by 4½
36 by 4	37 by 4½
34 by 4½	35 by 5
36 by 4½	37 by 5
38 by 4½	39 by 5
40 by 4½	41 by 5
42 by 4½	43 by 5
36 by 5	37 by 5½
36 by 5½	37 by 6
38 by 5½	39 by 6
40 by 5½	41 by 6



DEMOUNTABLE RIM- STRAIGHT SIDE TIRE



QUICK DETACHABLE STRAIGHT SIDE TIRE

Make and Model	Make of Tire	Size of Tire	Style of Bead	Make of Rim	Type of Wheels	Make of Wheels
Ace G	Firestone	32x4—C.	S. S.	Firestone	A.,W.,D.	Mutual
Allen 43	Miller	32x4—F.	S. S		A.,W.,D.	Automotive
Ambassador	Firestone	32x4½ 33x5	S. S.	Disteel		
American C	Firestone	32x4—C. 33x4—C	S. S.	Firestone	A., W., D.	Wayne
Anderson 40	Firestone	33x4—F.	S. S.	Firestone	A., W., D.	Royer, Houk, Disteel
Apperson 8-21	Opt.	34x4½—C.	S. S.	Firestone	A., W.	
Auburn Beauty	Goodrich	33x4—F.	S. S.	Firestone	A.	
Beggs Six	Goodrich	33x4—F	S. S.		A., D.	Mutual, Disteel
Bour-Davis	Goodyear Firestone	33x4½—C.	S. S.	Firestone	A., D.	Standard, Disteel
Brewster 91		32x4½—C.	S. S.		A.	Schwarz
Briscoe 4-34	Miller, Ajax	31x4—F.	Q. D. Cl.		A.	Hayes
Buick	Optional	33x4—F. 34x4½—F.	S. S.	Jaxon	A.	Imperial
Cadillac 59	Goodyear, U. S.	35x5—F.	Q. D. Cl.	Kelsey	A.	Kelsey
Case V	Goodyear	34x4½—F.	S. S.	Firestone	A.	Mutual
Chalmers	Optional	32x4—C.	S. S.		A.	
Champion S	Goodrich	32x3½—F.	S. S.		A.	
Chandler	Goodrich	32x4—F. 33x4—F. 34x4½—F.	S. S.	Firestone	A.	
Chevrolet 490	Goodyear	30x3½—F.	S. S., Cl.	Jaxon	A.	Hayes
Chevrolet FB	Goodrich	33x4—F.	S. S.	Jaxon	A.	
Cleveland 40	Goodrich	32x4—F.	S. S.	Firestone	A., W.	Opt.
Climber S	Goodyear	32x4½—F.	S. S.	Jaxon	A.	Royer
Cole 870	Goodrich	33x5—C.	S. S.	Firestone	A.	Prudden
Columbia Six	Firestone	32x4—F.	S. S.	Firestone	A., W., D.	
Commonwealth	Goodrich	32x4—F.		Firestone	A.	Mutual
Crawford	Goodrich	32x4—C.	S. S.		A.	Hoopes
Cunningham V-4	Opt.	35x5—C.	S. S.	Firestone	A., W., D.	
Daniels D-19	Opt.	34x4½—C. 33x5—C.	S. S.	Firestone	A., W., D.	Schwarz, Budd, Disteel
Davis 51	Goodrich	33x4—C.	S. S.	Firestone	W., D.	Bimel
Dixie Flyer	Fisk	32x4—F. C.	S. S.	Standard	A., W.	Own, Houk
Dodge Bros	Opt.	32x3½—C. 33x4—C.	S. S.	Kelsey	A., W.	Kelsey
Dorris 6-80	Goodyear Goodrich	33x5—C.	S. S.	Firestone	A.	Mutual
Dort 17-A	Goodyear	31x4—F.		Cleveland	A., W.	Imperial, Phillips
DuPont A	Goodrich	32x4—C. 32x4½—C.	S. S.	Firestone	A., W.	Jones, Hayes
Elcar 7-R	Firestone	33x4—F.	S. S.	Stanweld	A., D.	Bimel
Elgin K	Firestone Goodyear	33x4—C.	S. S.	Firestone	A., D.	
Essex A	Goodyear, Fisk	32x4—C.	S. S.	Kelsey	A.	Kelsey
Ferris		32x4½—C.	S. S.	Disteel	W., D.	
Ford T	Opt.	30x3½—F.	Cl.	Kelsey & Hayes	A.	Kelsey & Hayes
Franklin 9-B	Goodyear	32x4—C.	S. S.	Goodyear	A.	Hoops
Friend Four	Firestone Goodrich	32x3½—F.	S. S.	Perlman	A.	Bimel
Gardner G	Goodyear Firestone	32x3½—F. 32x4—F.	S. S.	Jaxon	A.	Hayes
Globe Four		32x4	S. S.	Firestone	A.	Bimel
Grant Six HX	U. S., Firestone	32x4—C. 33x4½—C.	S. S.	Firestone	A.	Royer
Halladay 21	Firestone	33x4—C.	S. S.	Firestone	A.	Bimel
Hanson Six	Goodrich	32x4—C.	S. S.	Kelsey	A.	Kelsey
Harroun AA-2	Miller	30x3½—F.	Q. D. Cl.	Stanweld	A.	Auto Wheel
Hatfield A-42	Firestone	32x4—F.	S. S.	Firestone	A., W.	Hoopes
Hayes 47	Opt.	34x4½—C.	S. S.	Firestone	A.	Bimel
H. C. S Series 3	Goodrich	32x4½—C.	S. S.	Stanweld	W.	Hayes
Holmes S-4	Goodyear	34x4½—C.	S. S.	Firestone	A.	
Hudson S-6	Opt.	34x4½—F.	S. S.	Kelsey	A.	Kelsey
Hudson O	Goodyear, Fisk	34x4½—F. or C.	S. S.	Kelsey	A.	Kelsey
Hupmobile R	Goodyear	32x4—F. C.	S. S.	Kelsey	A., W.	
Jackson 6-38	Goodyear	32x4½—C.	S. S.	Jaxon	D.	Disteel
Jordan M	Goodrich	32x4—C.	S. S.	Firestone	A.	Prudden
Kenworthy 8-90	Goodrich Firestone	32x4½—C.	S. S.		W., D.	Rudge Whitworth, Disteel
King H	Goodrich	32x4½—C.	S. S.	Firestone Stanweld	A., W.	

Continued on next page — first column

1921 Cars, continued from preceding page

Make and Model	Make of Tire	Size of Tire	Style of Bead	Make of Rim	Type of Wheels	Make of Wheels
Kissel Kar	Goodyear Firestone	32x4½—C.	S. S.		W.	Houk
Kline Kar	Goodyear	33x4—F.	S. S.	Firestone	A.	Bimel
Kurtz Automatic	Opt.	32x4—C.	S. S.	Firestone	A.	Bimel
LaFayette 134	Firestone	33x5—C.	S. S.	Firestone	A.	
Leach	Goodyear	32x4½—C.	S. S.		W., D.	Houk, Disteel
Lincoln	Opt.	33x5—C.	S. S.	Kelsey	W., D.	
Lexington S	Opt.	32x4—C.	S. S.	Kelsey	W., D.	Kelsey
Lexington T	Opt.	32x4½—C.	S. S.	Firestone	A., W., D.	
Liberty	Goodyear	32x4—F. or C.	S. S.	Firestone	A.	Prudden
Locomobile 48	Goodyear	35x5—C.	S. S.	Firestone	A.	
Lorraine 21-T		32x4—F.	S. S.	Firestone	A.	Standard
Maibohm B	Fisk	32x4—F.	S. S.	Stanweld	A.	Bimel
Marmon 34	Goodyear Goodrich	32x4½—C. 33x5—C.	S. S.	Stanweld	A., W.	Hayes
McFarlan 1921	Goodrich, U. S.	33x5—C.	S. S.		A., W., D.	
Maxwell	Opt.	30x3½—F. or C.	Cl.	Kelsey	A.	Kelsey
Mercer Series V	Goodyear Goodrich	32x4½—C. 33x5—C.	S. S.	Firestone	A., W.	Own, Rudge, Whitworth
Merit B	Goodrich Firestone	32x4—C.	S. S.	Firestone	A., W., D.	
Metz 1921	Goodrich	32x4—F.	S. S.	Firestone	A.	Eames
Meteor R & R R	Goodyear Goodrich	32x4½—C.	S. S.		W.	Rudge Whitworth
Mitchell F-40	Opt.	33x4—F.	S. S.	Firestone	A.	Own
Moon 6-48	Miller	32x4—C.	S. S.	Firestone	A., W., D.	
Nash Four	Goodrich Firestone	32x4—C.	S. S.	Firestone	A., W., D.	
Nash 681	Opt.	32x4—C. 34x4½—C.	S. S.	Firestone	A., W.	Auto Wheel
National Sextet	Opt.	32x4½—C.	S. S.	Firestone	A.	Schwarz
Noma 1-C	Goodyear	32x4½—C.	S. S.		W.	Wire Wheel
Oakland 34-C	Goodyear	32x4—F.	S. S.	Jaxon	A., W.	
Oldsmobile 43-A	Goodyear	32x4—	S. S.	Jaxon	A.	Auto Wheel
Overland 4	Fisk, Federal	30x3½—F.	Cl.	Stanweld	A.	Own
Packard S-6	Goodrich Firestone	33x4½—C.	S. S.	Kelsey	A.	Kelsey
Packard T-6	Firestone Kelly-Springfield	35x5—C.	S. S.	Firestone	A.	Own
Paige 6-42	Firestone Goodrich	32x4—F.	S. S.	Kelsey	A.	Kelsey
Paige 6-66	Goodyear Firestone	33x4½—C.	S. S.	Kelsey	A.	Kelsey
Pan American	Firestone	33x4—C.	S. S.	Firestone	A., W.	Mutual, Hayes
Paterson 6-50	Opt.	33x4—F. 34x4½—F.	S. S.	Jaxon		
Peerless 56	Goodyear	34x4½—C.	S. S.	Firestone	A.	Schwarz
Piedmont 4-30	Opt.	32x3½—F.	S. S.	Firestone	A.	E & O
Piedmont 6-40	Goodyear	32x4—F.	S. S.	Firestone	A.	Muncie
Pierce-Arrow	Opt.	35x5—C.	S. S.	Firestone	A.	Own
Pilot 6-50	Miller	32x4½—C.	S. S.	Cleveland	A.	Standard
Porter 45	U. S.	35x5—C.	S. S.	Firestone	A., W.	Jones, Standard
Premier 6-D	Opt.	33x5—C.	S. S.	Firestone	A.	Bimel
Ranger	Firestone	32x4—F.	S. S.	Firestone	A.	Bimel
Reo T-6	U. S.	33x4—C.	S. S.	Firestone	A.	Prudden
R. & V. Knight J	Goodrich Firestone	32x4½—C.	Q. D. Cl.	Firestone	A., W., D.	Mutual
R. & V. Knight R	Goodrich Firestone	32x4—C.	Q. D. Cl.	Firestone	A., W., D.	Mutual
Roamer 6-54-E	Firestone Goodyear	32x4½—C.	S. S.	Firestone	W.	
Revere	Goodrich	32x4½—C.	S. S.	Houk	W.	Houk
Saxon 125	Firestone Republic	32x4—F.	S. S.	Firestone	W., D., A.	Houk, Disteel, Prudden
Sayers Six DP	Goodyear	33x4—F.	S. S.	Cleveland	A.	Bimel
Scripps-Booth	Goodyear	32x4—C.	S. S.	Kelsey	A., W.	Kelsey
Seneca	Miller	30x3½—F.	Cl.	Jaxon	A.	Automotive
Skelton 35	Miller	32x3½—F.	S. S.	Firestone	A.	Standard
Standard	Fisk	34x4½—C.	S. S.	Firestone	A.	Motor Wheel
Stanwood Six	Firestone	33x4—C.	S. S.	Stanweld	A.	Standard
Stearns-Knight	Opt.	34x4½—C.	S. S.	Firestone	A.	Standard
Stephens 90	Fisk	33x4½—C.	S. S.	Stanweld	A.	Mutual
Stevens-Duryea	Fisk	35x5—C.	S. S.	Firestone	A.	Archibald
Studebaker EJ	Goodyear Goodrich Fisk	32x4—C.	S. S.	Kelsey	A.	Kelsey
Studebaker EH	Goodyear Goodrich Fisk	32x4—C.	S. S.	Kelsey	A.	Kelsey

Continued below

1922 Cars, continued

Make and Model	Make of Tire	Size of Tire	Style of Bead	Make of Rim	Type of Wheels	Make of Wheels
Essex	Miller Goodyear	32x4—C.	S. S.	Firestone	W.	Wood Wheel
Falcon H. P. M.	U. S.	27x3½—F.	Cl.		W.	Rudge Whitworth
Ferris 60	Firestone	32x4½—C.	S. S.	Disteel	D.	Disteel
Ferris 70	Firestone	32x4½—C.	S. S.	Disteel	D.	Disteel
Ford T	Opt.	30x3½—F.	Cl.	Kelsey, Hayes	A.	Kelsey, Hayes
Franklin 9-B	Goodyear	32x4—C.	S. S.	Goodyear	A.	Hoopes
Gardner	Goodyear	32x4—C. 32x3½—C.	S. S.	Jaxon	A.	Hayes
Goodspeed	Goodyear	32x4½—C.	S. S.		W.	Hayes
Grant	Opt.	32x4—C. 33x4½—C.	S. S.	Firestone	A.	Royer
H. C. S. Series 3	Goodrich	32x4½—C.	S. S.	Stanweld	W.	Hayes
Halladay 4	Goodrich Firestone	32x4—C.	S. S.	Firestone	A., D.	
Halladay 6	Goodrich Firestone	32x4—C.	S. S.	Firestone	A., D.	
Handley-Knight B	Fisk	32x4½—C. 33x5—C.	S. S.	Firestone	A., D.	Motor Wheel
Hanson 6 60	Opt.	32x4—C. 33x4½—C.	S. S.	Kelsey	A., W., D.	Kelsey, Houk, Disteel
Hatfield A-42	Firestone	32x4—C.	S. S.	Firestone	A.	Hoopes
Haynes 48	Opt.	34x4½—C.	S. S.		W.	Houk
Haynes 55	Opt.	33x4—C.	S. S.	Firestone	A.	Motor Wheel
Haynes 75	Opt.	34x4½—C.	S. S.	Firestone	A.	Motor Wheel
Holmes 4	Opt.	34x4½—C.	S. S.	Firestone	A.	Royer
Hudson S-6	U. S. Goodrich	34x4½—C.	S. S.	Firestone	A.	Wood Wheel
Hupmobile R	Goodyear	32x4—C.	S. S.	Kelsey	A.	Kelsey
Jewett Six	Miller	31x4—C.	S. S.	Kelsey	A.	Kelsey
Jordan MX	Goodrich	32x4—C.	S. S.	Firestone	A., W.	Motor Wheel, Wire
Jordan F	Goodrich	32x4½—C.	S. S.	Firestone	A., W.	Motor Wheel, Wire
King K	Firestone	32x4½—C.	S. S.	Firestone	A., W., D.	Opt.
Kissel	Firestone Goodrich	32x4½—C.	Q. D.	Firestone Goodyear	W.	
Kline Kar 6-55-K	Opt.	33x4—C.	S. S.	Firestone	A.	Bimel
LaFayette 134	Goodyear	33x5—C.	S. S.	Firestone	A.	Own
Leach 999		32x4½	S. S.		D.	Disteel
Lexington ST-22	Firestone Goodyear	32x4—C.	S. S.	Kelsey	A.	Kelsey
Lexington T-22	Firestone Goodyear	32x4½—C.	S. S.	Firestone	A.	Firestone
Liberty 10-D	U. S.	32x4—C.	S. S.	Tuare	A.	Lansing
Lincoln	Opt.	33x5—C.	S. S.	Kelsey	A.	
Locomobile 48	Opt.	35x5—C.	S. S.	Firestone	A.	
Maibohm B	Fisk	32x4—C.	S. S.	Stanweld	W., D., A.	Houk, Harvey, Bimel
Marmon 34	Goodrich U. S.	32x4½—C. 33x5—C.	S. S.	Stanweld Goodyear	W.	Houk
Maxwell	Fisk	31x4—C.	S. S.		D.	Forsyth
Mercer 5	Goodyear Goodrich	32x4½—C. 33x5—C.	S. S.	Firestone	A., W.	Schwarz, Standard
Merit	Firestone Goodrich	32x4—C.	S. S.	Cleveland	A., W., D.	Royer
McFarlan TV	Goodrich U. S.	33x5—C.	S. S.	Firestone	W., A., D.	
Meteor 22-80	Goodyear	32x4½—C.	S. S.	Cleveland	W.	Rudge Whitworth
Mitchell F-50	Goodyear	32x4½—C. 33x4—C.	S. S.	Firestone	A.	Own
Monroe	Goodyear	32x3½—C. 33x4—C.	S. S.	Firestone	A.	Standard
Moon 6-40	Miller	31x4—C.	S. S.	Firestone Cleveland	A., D.	Mutual, Disteel
Moon 6-48	Miller Kelly-Springfield	32x4—C.	S. S.	Firestone Cleveland	A., D.	Mutual, Disteel
Murray-Mac	Goodrich	34x4½—C. 35x5	S. S.	Firestone	A.	
Nash 691-2	Firestone Goodyear	33x4 34x4½—C.	S. S.	Firestone	A.	Own
Nash Four 41-4	Firestone Goodyear	33x4—C.	S. S.	Firestone	A.	Own
National BB	Opt.	32x4½—C.	S. S.	Firestone	A.	Schwarz
Noma 1-D	Goodyear	32x4½—C.	S. S.		W.	Wire Wheel
Noma 3-C	Goodyear	32x4½—C.	S. S.		W.	Houk
Norwalk 4-30-KS	Firestone Goodrich	32x3½—F.	S. S.	Firestone	W., A.	E. & O., Houk
Oakland 6-44	Opt.	32x4—C.	S. S.	Firestone	A.	Imperial
Ogren Six	Brunswick	33x5—C.	S. S.	Firestone	W., D.	Rudge Whitworth, Disteel
Oldsmobile 46	Opt.	33x4½—C.	S. S.	Jaxon	A., W.	Motor Wheel

Continued below

Studebaker.....EG	Goodyear Goodrich Fisk	32x4½—C.	S. S.	Kelsey	A.	Kelsey
Stutz.....	Goodrich.....	32x4½—C.	S. S.	Stanweld	W.	Houk
Templar.....445	Firestone Goodrich	32x4—C.	S. S.	Firestone	A., W.	Bimel, Houk
Tulsa.....E-1-2-3	Firestone	33x4—F.	S. S.	Standard	A., W.	Mutual
Velie.....48	Miller	33x4—F. 33x4½—F.	S. S.	Firestone	A.	
Velie.....34	Miller	32x3½—C. 33x4—C.	S. S.	.....	A.	
Westcott.....C-38	Firestone	33x4—C.	S. S.	Firestone	A., W., D.	Own, Houk, Disteel
Westcott.....C-48	Firestone	32x3½—C.	S. S.	Firestone	A.	
Willys-Knight.....	Fisk, Federal	33x4—C. 34x4½—C.	S. S.	Stanweld	A.	Own
Winton Six.....	Opt.	35x5—C.	S. S.	Firestone	A.	

Tires, Rims and Wheels for 1922 Cars

Make and Model	Make of Tire	Size of Tire	Style of Bead	Make of Rim	Type of Wheels	Make of Wheels
Ace.....F	Goodyear	32x4—C.	S. S.	Firestone	A., W., D.	
Ace.....L	Goodyear	32x4—C.	S. S.	Firestone	A., W., D.	Mutual
Ace.....C	Goodyear	33x4½—C.	S. S.	Firestone	A., W., D.	
Ambassador.....R	Firestone	33x5—C.	S. S.	Firestone	A., W.	
American.....C	Firestone	33x4½—C.	S. S.	Firestone	W., D.	Wayne
Anderson.....40	Firestone	33x4—C.	S. S.	Firestone	A., W., D.	Royer, Disteel, Houk
Apperson.....8	Opt.	34x4½—C.	S. S.	Firestone	A., W.	Houk
Auburn Beau.....6	Goodrich	32x4—C. 32x4½—C.	S. S.	Firestone	A.	Motor Wheel
Biddle.....B-1 & B-5	Opt.	32x4—C.	S. S.	Firestone	A.	Archibald
Brewster.....O-2	.....	32x4½—C.	S. S.	Firestone	A.	Schwarz
Buick.....44-48	Opt.	33x4—C.	S. S.	Jaxon	A.	Imperial, Jaxon
Buick.....34-37	Opt.	31x4—C.	S. S.	Jaxon	A.	Imperial, Jaxon
Cadillac.....61	Goodyear U. S.	33x5—C.	S. S.	Kelsey	A.	Kelsey
Case.....X	Goodyear	32x4½—C.	S. S.	Firestone	A.	Mutual
Case.....V	Opt.	34x4½—C.	S. S.	Firestone	A.	Mutual
Chalmers.....35-C	Fisk	32x4—C.	S. S.	Kelsey	A.	Kelsey
Champion.....S	Goodrich	32x4—F.	S. S.	Stanweld	A.	
Champion.....T	Goodrich	32x3½—F.	S. S.	Stanweld	A.	
Chandler Six.....	Opt.	33x4—C. 34x4½—C.	S. S.	Firestone	A.	
Chevrolet.....490	Goodyear	30x3½—C.	S. S., Cl.	Jaxon	A.	Hayes
Chevrolet.....FB	Goodrich	33x4—C.	S. S.	Jaxon	A.	
Cleveland.....41	Goodrich	32x4—C.	S. S.	Firestone	W., D.	Standard, Royer
Climber.....S	Opt.	32x4½	Cl.	Jaxon	A., W., D.	Royer
Climber.....K	Goodyear Miller	33x4 33x4—F. or C.	S. S.	Jaxon	A., W.	Royer
Cole.....890	Goodrich	33x5—C.	S. S.	Firestone	A.	Muncie
Columbia.....DC-CS	Goodrich Firestone	32x4—C.	S. S.	Firestone	W., D.	Hayes, Disteel
Columbia Challenger..	Goodrich	32x4—C.	S. S.	Firestone	A., W.	Hayes
Columbia Light Six...	Fisk	31x4—C.	S. S.	.....	A., D.	Disteel
Comet.....C-53	Opt.	33x4½—C.	Q. D.	Firestone	A.	Mutual
Crawford.....	.....	32x4				
Cunningham.....V	Opt.	33x5—C.	S. S.	Firestone	A., W.	Opt.
Daniels.....D-19	Opt.	34x4½—C. 33x5—C.	S. S.	Firestone	A.	Schwarz
Davis.....71	Goodrich	31x4—C.	S. S.	.....	D.	Disteel
Davis.....61-67	U. S.	32x4—C.	S. S.	Firestone	A., D.	Own, Disteel
Dixie Flyer.....H	Fisk	32x4—F., C.	S. S.	Standard	A.	Own
Dodge Bros.....	Opt.	32x4—C.	S. S.	Kelsey	A., D.	Kelsey, Budd
Dorris.....6-80	Goodrich Goodyear	33x5—C.	S. S.	Firestone	A.	Mutual
Dort.....19	Miller	31x4—C.	S. S.	Cleveland	A., W.	Imperial
Driggs.....	Miller	30x3½—F.	Cl.	.....	W.	Dayton
Duesenberg.....	.....	33x5—C.	S. S.	Goodyear	W.	Rudge Whitworth
DuPont.....A	U. S.	32x4—C. 33x4½—C.	S. S.	Firestone	A.	
Durant.....A-22	Fisk	31x4—C.	S. S.	Hayes	A.	Hayes
Durant.....B-22	Fisk	32x4½—C.	S. S.	Hayes	A.	Hayes
Earl.....40	Ajax	32x4—C.	S. S.	Hayes	A.	Hayes
Elcar.....K-4	Firestone	33x4—C.	S. S.	Standard	A., D.	Bimel
Elcar.....7-R	Firestone	33x4—C.	S. S.	Standard	A., D.	Bimel
Elgin.....K-1	Opt.	33x4—C. 32x4—C.	S. S.	Firestone	A., W., D.	Hayes, Budd

Continued at top of preceding page

Oldsmobile.....43-A	Opt.	32x4—C.	S. S.	Jaxon	A.	Motor Wheel
Oldsmobile.....47	Opt.	32x4—C.	S. S.	Jaxon	A.	Motor Wheel
Overland.....4	Fisk Federal	30x3½—F.	Cl.	Hayes Stanweld	A., W.	Hayes, Imperial
Packard Twin.....6	Opt.	35x5—C.	S. S.	Firestone	A.	Own
Packard Sing.....6	Firestone Miller	33x4½—C.	S. S.	Firestone	A.	Firestone
Paige.....6-66	Firestone Goodrich	33x4½	S. S.	Kelsey	A., W., D.	Kelsey
Paige.....6-44	Firestone Goodrich	32x4—C.	S. S.	Kelsey	A., W., D.	Kelsey
Paterson.....22-6-52	Goodrich	32x4½—C.	S. S.	Jaxon	A.	Imperial
Peerless.....56	Firestone	34x4½—C.	S. S.	Firestone	A.	Schwarz
Piedmont.....4-30	Goodyear	32x3½—F.	S. S.	Firestone	A.	E. & O.
Piedmont.....6-40	Goodyear	32x4—C.	S. S.	Firestone	A.	E. & O.
Pierce-Arrow.....33	Opt.	33x5—C.	S. S.	Firestone	A.	Hoopes
Pilot.....6-50	Miller	32x4½—C.	S. S.	Jaxon	Opt.	Bimel
Porter.....46						
Premier.....6-D	Opt.	32x4½—C. 33x5—C.	S. S.	Firestone	A.	Bimel
Premocar.....	Goodyear	32x4—C.	S. S.	Firestone	A., W.	E. & O., Wire Wheel
R. & V. Kn.....J	Goodrich Firestone	32x4½—C.	S. S.	Firestone	A.	Mutual
R. & V. Kn.....R	Goodrich Firestone	32x4—C.	S. S.	Firestone	A.	Mutual
Reo.....T-6-B	U. S.	33x4—C.	S. S.	Firestone	A.	Prudden
Revere.....	Goodrich	32x4½—C.	S. S.	Houk	W.	Houk
Rickenbacker.....A	.....	32x4—C.	S. S.	Firestone	A.	Motor Wheel
Roamer.....6-54-E	Goodrich Firestone	32x4½—C.	S. S.	Firestone	W.	Hayes
Roamer.....4-75-E	Goodrich Firestone	32x4½—C.	S. S.	Firestone	W.	Hayes
Rolls Royce.....	Opt.	33x5—C.	S. S.	Dunlop	W.	Dunlop
Saxon.....125-G	Firestone Goodrich	32x4—C.	S. S.	Firestone	A., W., D.	Prudden
Sayers Six.....	Firestone Goodrich	33x4—C.	S. S.	Cleveland	A.	Bimel
Seneca.....L-2 & O-2	Miller	30x3½—C.	Cl.	Jaxon	A.	Automotive
Seneca.....50-1	Miller	31x4—C.	S. S.	Stanweld	A.	Automotive
Standard, Sterling....	Fisk Firestone	34x4½—C.	S. S.	Firestone	A.	Motor Wheel
Stanley.....735	Goodrich Goodyear	34x4½—C.	S. S.	Firestone	A., W., D.	
Stanwood.....A-22	Standard	33x4—C. 32x4½—C.	S. S.	Stanweld	A., W.	Standard, Wire
Stearns-Kn....SKL-4	Goodrich	34x4½—C.	S. S.	Firestone	A.	Wayne
Stephens.....90	Fisk	33x4½—C.	S. S.	Stanweld	A., W.	Mutual, Rudge Whitworth
Stevens-Duryea.....E	Opt.	33x5—C. 35x5—C.	S. S.	Firestone	A.	Archibald
Studebaker.....B-6	Opt.	33x4½—C.	S. S.	Kelsey	A.	Kelsey
Studebaker.....S-6	Opt.	32x4—C. 33x4½—C.	S. S.	Kelsey	A.	Kelsey
Studebaker.....L-6	Opt.	32x4—C.	S. S.	Kelsey	A.	Kelsey
Stutz.....K	Goodrich	32x4½—C.	S. S.	Stanweld	W.	Houk
Templar.....445	Firestone Goodrich	32x4—C.	S. S.	Firestone	A., W.	Bimel, Houk
Tulsa.....E-1-2-3	Firestone	32x4 F., C. 33x4—F., C.	S. S.	Stanweld	A., D.	Mutual
Velie.....58	Miller	32x4—C. 32x4½—C.	S. S.	Firestone	A.	Mutual
Velie.....48	Miller	32x4—C. 33x4½—C.	S. S.	Firestone	A.	Mutual
Velie.....34	Miller	32x3½—C. 33x4—C.	S. S.	Firestone	A.	Mutual
Vogue.....6-55	Firestone Goodrich	32x4—C. 33x4½—C.	S. S.	Firestone	.....	Opt.
Vogue.....6-66	Firestone Goodrich	33x4½—C.	S. S.	Firestone	.....	Opt.
Westcott.....C-48	Firestone	32x4½—C.	S. S.	Firestone	A.	Motor Wheel
Westcott.....A-44	Firestone	32x4—C.	S. S.	Firestone	A.	Motor Wheel
Willys-Knight.....20	Fisk Firestone	33x4—C.	S. S.	Stanweld	A., W.	
Wills Sainte Claire...	U. S.	32x4½—C.	S. S.	Cleveland	D.	Michelin
Winton.....6	Opt.	35x5—C.	S. S.	Firestone	A., W., D.	
Winther.....6-61	Goodyear	32x4½—C.	S. S.	Firestone	A.	Bimel

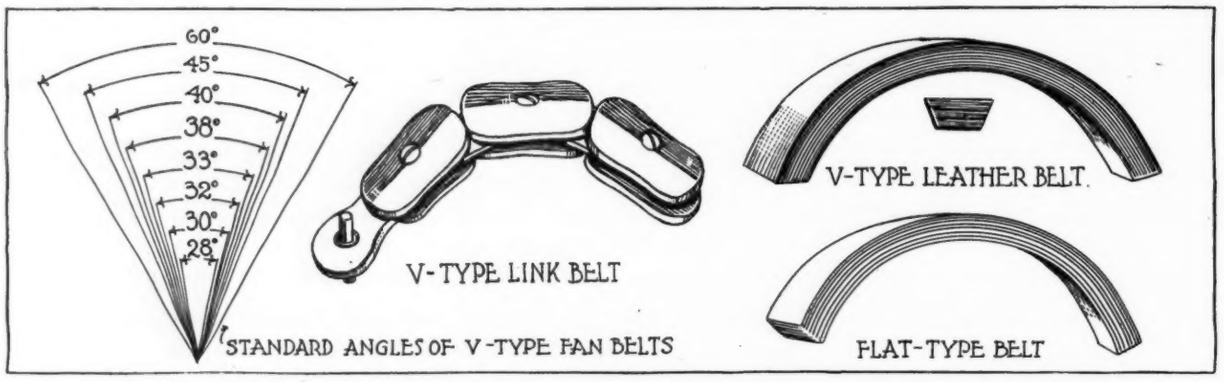
ABBREVIATIONS

C	Cord
F. or C	Fabric or Cord
F	Fabric
S. S	Straight Side
Cl	Clincher
Q. D	Quick Detachable
A	Artillery
W	Wire
Disc	Disc
Opt	Optional

Additional Copies of this Maintenance Data May be Obtained by Writing to Motor Age

FAN BELT SIZES AND TYPES—1922 CARS

Motor Age Maintenance Data Sheet No. 178



TO FIND THE LENGTH OF BELT REQUIRED FOR TWO GIVEN PULLEYS

When the length cannot be measured directly by a tape line the following rule may be used: Add the diameter of the two pulleys, divide the sum by 2 and multiply the quotient by 3¼ and add the product to twice the distance between centers of the shaft.

NAME	Model	Type	Length	Width	Degree of Angle
Ace	F	flat	35½	1⅛	
Ace	C	vee	36¼	⅝	45°
Ace	L	flat	35½	1⅛	
Ambassador	R	vee (link)	48½	9/16	
American	C	flat	33	1	
Anderson	Series 40	flat	32⅞	1¼	
Apperson	Eight	flat	38¼	1¾	
Auburn Beauty	6-51	flat	31	1¼	
Biddle	B1 & B5	flat			
Brewster	02	Timing Chain			
Buick	44-48	flat	30	1¼	
Buick	34-37	flat	30	1¼	
Cadillac	61				
Case	X	flat	32½	1¼	
Case	V	vee		¾	60°
Chandler	1922	flat	35 13/16	1	
Chevrolet	490	vee		21/32	32°
Chevrolet	FB				
Cleveland	40	vee	42	⅝	28°
Climber	S	flat	31½	1	
Climber	K	flat	31	1	
Cole Aero	870	vee	44 1/16	¾	38°
Columbia	DC & CS				
Columbia	Challenger				
Columbia	Light Six				
Comet	C53-2	vee	37 3/16	¾	
Cunningham	V-4	No belt used			
Daniels	D-19	vee	43⅜	¾	30°
Davis	71				
Davis	61-67				
Dixie Flyer	H	flat	33	⅞	
Dodge Brothers		flat	31	1	
Dorris	6-80	flat	41 7/16	1¼	
Dort	19	flat	32½	1	
Duesenberg	Straight 8	vee	34	⅝	
DuPont	A				
Durant	A-22	vee	38½	⅝	32°
Durant	B-22	vee	28⅞	11/16	32°
Earl	40	flat	34¼	1	
Elcar	K4	flat	30½	1	
Elcar	7R	flat	33½	1¼	
Elgin	K-1	flat	39 7/16	1	
Essex		flat	41½	1	
Ford	T	flat	27⅜	1⅛	
Franklin	9B	No belt used			
Gardner		flat	31½	1	
Grant		flat	41½	1¼	
Halladay	Light 4	flat	31	1	
Halladay	Six	flat	29¾	1	
Hatfield	A-42	flat	33	1	
Handley-Knight	B	flat	31 15/16	1	
Hanson	30				
Hanson	60				
Haynes	48				
Haynes	55	flat	34¼	¾	
Haynes	75	vee	32	19/32	28°
H. C. S.	Series 3				
Holmes	Series 4	No belt used			
Hudson	Super Six	flat	34⅞	1	
Hupmobile	R	vee	24⅞	⅝	45°
Jewett	"6"	flat	33 15/16	1	
Jackson	638	flat	39	1	
Jordan	MX	vee	42⅝	9/16	28°
Jordan	F	vee	40⅜	¾	28°
King	K	flat	30	1 3/16	
Kissel	Six	flat	34 9/16	1	
Kline	6-55	flat	35	1¼	
Leach	999	No belt used			
Lexington	ST-22	vee		9/16	28°
Lexington	T-22	vee		9/16	28°
Liberty	10-C	flat		1¼	
Locomobile	48	vee	54⅛	¾	28°
Maibohm	B	flat	37½	1	
Marmon	34	vee		¾	33°
Maxwell					
Mercer	Series 5	flat	32½	1	
Merit	B & C	flat	32	1¼	
McFarlan	T V	vee	42⅝	¾	28°
Meteor	22-80	flat	30⅝	1¼	
Mitchell	F-50	flat	33½	1¼	
Monroe		flat	44¼	1¾	
Moon	6-40	flat	39	1	
Moon	6-48	flat	31	1¼	
Nash	691-692				
Nash	41-4				
National	Series BB	flat	38½	1¼	
Noma	1D				
Noma	3C				
Norwalk	4-30 KS	flat	29	¾	
Oakland	6-44	vee	30½	⅝	38°
Ogren	Six	vee	43	¾	60°
Oldsmobile	46	vee	44	¾	40°
Oldsmobile	43A	vee	37	21/32	32°
Oldsmobile	47	flat	44	¾	40°
Overland	4				
Packard	Twin Six	vee (link)	45	¾	45°
Packard	Single Six	vee (link)	43	⅝	45°
Paige	6-66	flat	32⅝	1¼	
Paige	6-44	flat	36½	1⅜	
Paterson	22-6-52	flat	30	1⅜	
Peerless	56	Gear driven			
Pierce-Arrow	32	vee	42⅛	⅝	
Pilot	6-50	flat	30	1¼	
Pilot	6-45				
Premier	6-D	vee	40	¾	28°
R. & V. Knight	J	vee	34¾	⅝	28°
R. & V. Knight	R	vee	29¾	⅝	28°
Reo	T6	vee		5/16	28°
Revere		flat	29	1¼	
Rickenbacker	A	flat	28½	1	
Roamer	6-54-E	vee	37¾	⅝	48°
Roamer	4-75-E	flat	30⅝	1¼	
Rolls-Royce		vee (link)	44	⅝	28°
Saxon	125G	flat	39¾	¾	
Sayers	Six	flat	34½	1¼	
Seneca	L2 & O2	flat	29	1	
Seneca	50-51	flat	30¼	1	
Standard	Sterling	Gear driven			
Stanley	735	No belt used			
Stanwood	H-22	flat	33 13/32	1¼	
Stearns-Knight	SKL4	flat	36½	1	
Stephens	90	vee	34½	⅝	30°
Stevens-Duryea	E				
Studebaker	Big 6	flat	41¼	1¼	
Studebaker	Spec. 6	flat	41¼	1¼	
Studebaker	Light 6	flat	35¾	¾	
Stutz	Series K	flat	36	⅞	
Templar	445	flat	30⅝	1½	
Tulsa	E-1-2-3				
Velie	58	flat	30½	1	
Velie	48	flat	30½	1¼	
Velie	34	flat	39	1	
Westcott	C-48	vee	45	¾	60°
Westcott	A-44	flat	36	1¼	
Willys-Knight	20	flat	44	1	
Wills St. Claire	A-68				
Winton	Six				
Winther	61	flat	34 15/16	1¼	

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Columbus, O.	Columbus Auto Dealers Co.	Aug. 28-Sept. 3
Indianapolis	Indianapolis Automobile Trade Assn.	Sept. 4-9
Wilmington, Del.	Delaware State Fair	Sept. 4-9
Hartford, Conn.	Connecticut Fair Grounds	Sept. 4- 9
Spokane, Wash.,	Annual Show	Sept. 4-9
Chicago	Annual Show of the Automotive Equipment Association	Nov. 13-18

RACES

Tacoma, Wash.	Eleventh Annual Race	July 4
Strasbourg	French Grand Prix	July 15
Colo. Spgs., Colo.	Pike's Peak Race	Sept. 4
San Carlos, Cal.	500-Mile Armistice Day Race	Nov. 11

FOREIGN SHOWS

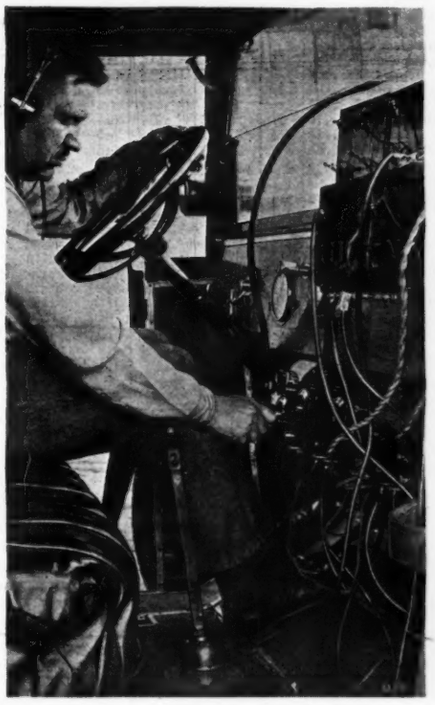
Berlin	Kaiserdamm Hall	Sept. 25-Oct. 3
Rio de Janiero	Automotive Exhibition	Sept., 1922
London	International Commercial Vehicle Exhibition	Oct. 12-13
Paris, France	Automobile Show	Oct., 4- 15
London	Annual Show	Nov. 3-11

CONVENTIONS

Olympia	Washington Automotive Trade Assn.	July 21-22

Radio Concerts for Bus Passengers

SHOULD tests which the California Transit Co., Oakland, Cal., started this week prove successful many of the 85 White buses operated by this line will be equipped with radio phones to pick up daily radio concerts in the bay region. With only a two step radio short wave receiving outfit and handicapped by the necessity of operating with a low antennae, the bus is able to pick up San Francisco and Oakland concerts as far as Martinez. At Sacramento a test was made by special arrangement with the Holbrecht broad-casting station. It was found that by a sacrifice of speed the concert was as audible when the bus was in motion as when it was standing at the curb. The photograph shows the dashboard equipment which is operated by the driver.



Dashboard equipment on radio bus

DEATH OF E. W. ESTBERG

Milwaukee, Wis., June 30—Emil W. Estberg, one of the veterans of the automotive trade in Wisconsin, died June 21 in Columbia hospital, Milwaukee, after a brief illness, following an operation. He was 55 years old. He was born in Waukesha and came to Milwaukee in 1905, engaging in business as one of the first dealers in the state, handling the old Pope-Toledo line. For several years he had been president of the Estberg-Deland Motor Co., handling the Chalmers and Maxwell. He was one of the charter members of the original dealers' association, now the Milwaukee Automotive Dealers' Assn., and held many offices.

SAFETY INSTRUCTIONS IN SCHOOLS

PORTLAND, ORE., July 5—Instruction in safety-first methods may be included in the public school curriculum of the states of Oregon, Washington and Idaho, if the unanimous recommendation of a special safety-first committee composed of officials of the three states is carried out.

HEARINGS ON GASOLINE PRICE

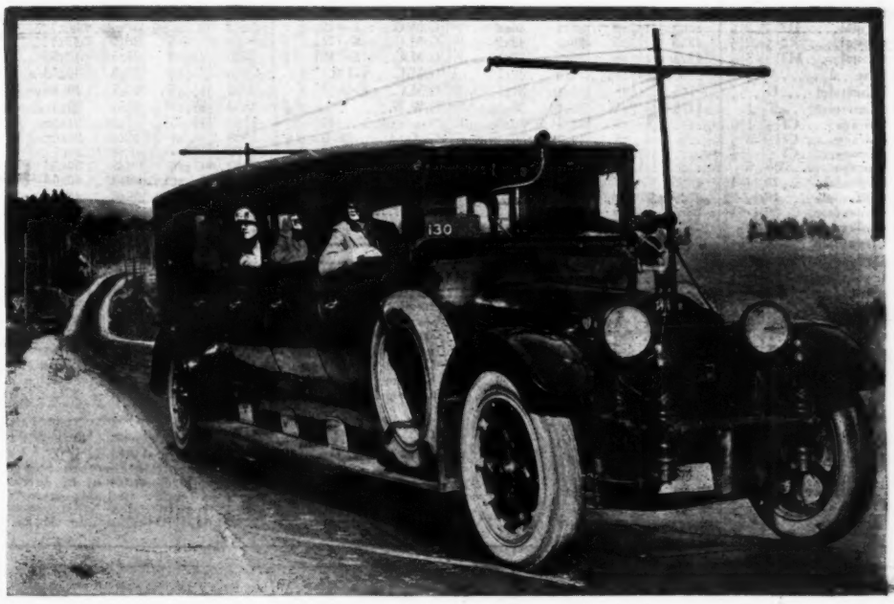
WASHINGTON, July 3—Hearings on the Senate gasoline investigation, being held by the Senate Manufacturing Committee, will be begun on July 15.

AUTOMOBILE MAN FREED

New York, June 30—Adolph Pricken, president of the Hamilton Motors Co., and of the Coastwise Warehouses, Inc., who was an trial before Judge Taylor in Brooklyn on a charge of grand larceny, was discharged when the court ruled that it had no jurisdiction. The charge against Pricken was based on statements that he had induced investors to put money into his warehouse enterprises on the promise of very large dividends. Pricken had returned all the money to dissatisfied investors.

M. A. M. A. CONTEST

New York, June 30—Directors of the Motor and Accessory Manufacturers' Assn. have decided to award a prize of $100 in gold to the employe or executive of any company belonging to the organization who writes the best 500 word letter outlining to present members as well as prospective members the advantages and benefits of using all the departments of the association's service. The prize will be presented and the winning letter read at the September credit convention. The letters will be judged by W. O. Rutherford, G. Brewer Griffin and Harry Horning.



Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾-1	$1650n	3¾x5	34x5n	34x5n	W
Acason....RB	1½	1950	3¾x5¼	36x3½	36x6	W
Acason....H	2½	2750	4⅜x5¾	36x4k	36x8k	W
Acason....L	3½	3450	4⅜x5¾	36x5k	36x10k	W
Acason....M	5	4350	5 x6½	36x6	40x12	W
Ace....C	1½	2295	3¾x5½	34x3½k	34x5k	W
Ace....A	2½	2795	4¼x5½	36x4k	36x7	W
Acme....20	1	....	3¾x5	35x5n	35x5n	W
Acme....30	1½	....	3¾x5	34x3½	34x5	W
Acme....40	2	....	3¾x5	34x3½	34x5	W
Acme....60	3	....	4½x5¼	36x4	36x7	W
Acme....60L	3	....	4½x5½	36x4	36x7k	W
Acme....90	4½	....	4½x5½	36x5	40x10	W
Acme....125	6¼	....	4¾x6	36x6	40x12	W
American....25	2½	3350	4 x6	36x4k	36x4dk	W
American....40	4	4275	4½x6	36x5k	36x5dk	W
Armleder....20	1	2350	3¾x5¼	34x3½k	34x5k	W
Armleder....21	1½	2425	3¾x5¼	34x3½	34x6	W
Armleder....40	1½	2850	4¼x5¼	34x3½	36x6	W
Armleder....HW	2½	3200	4¼x5½	36x4k	36x7k	W
Armleder....KW	3½	4150	4½x6	36x5	36x5d	W
Atlas....MD	1	1185	3½x5	32x4½n	32x4½n	W
Atterbury....20R	1½	2475	3¾x5	34x3½	34x5	W
Atterbury....7CX	2½	3175	4¼x5¼	36x4	36x4d	W
Atterbury....7D	3½	3975	4½x5½	36x5	40x5d	W
Atterbury....8E	5	4975	4¾x6	36x5	40x6d	W
Autocar....21UF	1½-2	1950	4¾x4½t	34x4k	34x5k	D
Autocar....21UG	1½-2	2050	4¾x4½t	34x4k	34x5k	D
Autocar....27H	2	2950	4 x5½	34x5	36x7	D
Autocar....27K2	2	3075	4 x5½	34x5	36x7k	D
Autocar....26Y	5	3950	4¼x5½	31x6	36x12	D
Autocar....26-B	5	4100	4¼x5½	31x6	36x12	D
Available....H1½	1½	2475	4 x5	36x3½k	36x5k	W
Available....H2	2	2775	4 x5	36x3½k	36x6k	W
Available....H2½	2½	3160	4 x5	36x4k	36x8k	W
Available....H3½	3½	4175	4½x5½	36x5	40x5d	W
Available....H5	5	5375	5 x6	36x6	40x12	W
*Avery	1	....	3 x4s	34x5n	34x5n	I
Beck....A Jr.	1¼	1285a	3½x5	32x4½n	32x4½n	I
Beck....B-30	1½	2050	3¾x5	34x5	36x6	
Beck....C-40	2	2150	3¾x5	36x6	36x6	
Beck....D-50	2½	2850	4½x5¼	38x7	40x8	
*Bell....(Penn.)	½	1000a	3½x5	31x4n	31x4n	B
Bell....M (Iowa)	1	1495	3½x5½	35x5	35x5n	W
Bell....E (Iowa)	1½	2100	3¾x5½	34x3½	34x5	I
Bell....O (Iowa)	2½	2550	4½x5½	34x4	34x6	I
Belmont	½	725	3½x4¼	31x4	31x4	B
Belmont....D	2	2575	4¼x5½	34x3½k	34x6k	I
Belmont....F	3	3500	4 x6	36x5k	36x5dk	I
Bessemer....G	1	....	3½x5	35x5n	35x5n	I
Bessemer....H-2	1½	....	3¾x5	36x3½	36x5	I
Bessemer....J-2	2½	....	4½x5¼	36x4	36x4d	I
Bessemer....K-2	4	....	4½x5½	36x5	36x10	I
Bethlehem....KN	1	1195	3½x5	34x4½n	35x5n	B
Bethlehem....CN	2	1595	4 x6¼	34x4½k	34x6k	I
Bethlehem....HN	3	2195	4 x5¼	36x4k	36x8k	I
Brinton....C	1½	1500	3¾x5	34x4	34x5	W
Brinton....D	2½	2250	4½x5¼	36x4	36x7	W
Brockway....E	1	....	3¾x5½	35x5n	35x5n	B
Brockway....S-5	1½	....	3¾x5	36x3½k	36x5k	W
Brockway....SK	1½	....	4½x5¼	36x4	36x6	W
Brockway....KR	2½	....	4½x5½	36x4	36x8	W
Brockway....K-5	2½	....	4½x5¼	36x4	36x8	W
Brockway....RT	3½	....	4¾x6	36x5	36x10	W
Brockway....R-4	3½	....	4½x5½	36x5	36x5d	W
Brockway....T-4	5	....	4¾x6	36x6	40x6d	W
*Buick	...	945b	3½x4¾	31x4n	31x4n	B
Capitol....G	1½	2975	3¾x5	35x5	38x7	W
Capitol....H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol....K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol....M3½	3½	4425	4¼x6	36x5	36x10	W
Case	2	....	4¼x5¾	36x6	38x7	I
*Chevrolet....G	¾	745	3¼x4	31x4n	31x4½n	B
*Chevrolet....T	1	1125	3¼x5½	33x4n	35x5n	W
Chicago....C1½	1½	....	4 x5	36x3½k	36x5k	W
Chicago....C2½	2½	....	4 x5	36x4k	36x7k	W
Chicago....C3½	3½	....	4½x5½	36x5	36x10	W
Chicago....D5	5	....	4½x5½	36x6	40x12	W
Clydesdale....10	¾-1½	1485	3¾x5	34x5n	34x5n	B
Clydesdale....18	¾-1½	1890	3¾x5	34x5	34x5	W
Clydesdale....20	1-1½	2385	3¾x5	34x5	34x5k	W
Clydesdale....42	1½-2	2175	3¾x5	36x3½	36x6	W
Clydesdale....65X	2½-3	3250	4½x5¼	36x4	36x8	W
Clydesdale....65EX	2½-3	3150	4½x5½	36x4	36x8	W
Clydesdale....90	3½-4½	4100	4½x5½	36x5	36x10	W
Clydesdale....120	5-6	4500	4¾x6	36x6	40x12	W
Columbia....H	1½	1895	4 x5	35x5	38x7n	I
Columbia....G	2½	2335	4 x5¼	36x4	36x7	I
Comet....T	1½	1950	3¾x5	34x4	34x4	W
Commerce....T	¾-1½	1450	3¾x5	34x4½n	34x4½n	B
Commerce....12	1½	1800	3¾x5	35x5n	35x5n	I
Commerce....16	2	2150	3¾x5	35x5n	36x6	I
Commerce....18	2½	2495	4½x5¼	36x6n	36x7n	I
Commerce....25	2½	2425	4½x5¼	36x4	36x7	W
Cook....51	2½	3600	4 x5½	36x6n	40x8n	W
Corbitt....E-22	1	1480	3¾x5	34x3½	34x4	W
Corbitt....D-22	1½	2200	3¾x5	34x3½	34x4	W
Corbitt....C-22	2	2600	4½x5½	36x3½	36x6	W
Corbitt....B-22	2½	3000	4½x5¼	36x4	36x7	W
Corbitt....R-22	3	$3200	4½x5½	36x4	36x8	W
Corbitt....A-22	3½-4	3800	4½x5½	36x5	36x10	W
Corbitt....AA-22	5	4500	4¾x6	36x6	40x6d	W
Day-Elder....AS	1	1600	3¾x5	35x5n	35x5n	W
Day-Elder....B	1½	2000	3¾x5	34x3½	34x5	W
Day-Elder....D	2	2400	4½x5¼	36x4	36x7	W
Day-Elder....C	2½	2750	4¼x5½	36x4	36x7	W
Day-Elder....F	3½	3150	4½x5½	36x5	36x5d	W
Day-Elder....E	5	4250	4½x6	36x5k	40x6dk	W
Dearborn....E	1	1600	3¾x5¼	36x5n	35x5n	W
Dearborn....FX	1½	2300	3¾x5½	34x4	34x5	W
Dearborn....F	1½	2180	3¾x5½	34x4	34x5	W
Dearborn....48	2	2590	3¾x5⅛	34x4½n	34x7	W
Defiance....G	1	1695a	3¾x5	35x5n	35x5n	B
Defiance....D	1½	2095a	3¾x5	35x5n	36x6n	I
Defiance....E	2	2275a	3¾x5	35x5n	38x7n	I
Denby....31	1¼	1485	3½x5	35x5n	35x5n	B
Denby....33	1½	2145	3¾x5	35x5n	38x7n	I
Denby....34	2	2395	3¾x5	36x3½	36x6	I
Denby....35	2½-3	2795	4¼x5¼	36x4	36x7	I
Denby....27	4	3895	4½x5½	36x5	36x5d	I
Denby....210	5	4295	4½x5½	36x6	40x6d	I
Dependable....A	¾-1	1650	3½x5½	34x5n	36x6n	W
Dependable....C	2	2350	3¾x5¼	34x3½	34x5	W
Dependable....D	2½	2650	4 x5½	34x5	36x6	W
Dependable....E	3	2950	4¼x5½	36x4	36x7	W
Diamond T....O-8	1-1¼	1975	3¾x5¼	36x3½n	36x4n	W
Diamond T....T	1½	2250	3¾x5¼	36x3½	36x5	W
Diamond T....U	2-2½	2650	4 x5¼	36x4	36x7	W
Diamond T....K	3½	3750	4¼x5½	36x5	36x5d	W
Diamond T....EL	5	4325	4½x5½	36x6	40x6d	W
Diamond T....S	5	4500	4¾x6	36x6	40x6d	W
*Diehl....A	1	....	3½x5	34x4½	35x5	I
Diehl....B	1½	....	3½x5	36x6	36x6	I
Doane	2½	4100b	4¼x5¾	36x5	36x7	C
Doane	3½	5100b	4⅝x5¾	36x5	36x5d	C
Doane	6	6000b	5 x6¼	36x6	40x6d	C
*Dodge Brothers	½	730	3⅞x4½	32x4n	32x4n	B
Dorris....K-4	2-2½	3400	4¼x5½	36x4	36x7	W
Dorris....K-7	3½	4400	4¼x5½	36x5	36x10	W
*Dort	½	685a	3½x5	31x4n	31x4n	B
Double Drive....B	3	4000	4¼x5½	6	6	W
Duplex....A	2	2775	4 x5¼	35x5n	38x7n	W
Duplex....E	3½	3500	4¼x5½	36x8	36x8	I
Duty....22	2	1590	3½x5	34x3½	34x5	I
Eagle....101	1½	1875	3⅝x5½	34x5	34x5	I
Eagle....100-2	2	2275	3¾x5¼	34x4k	34x7k	I
F. W. D....B	3	4200	4¾x5½	36x6	36x6	B
Fageol....1½	1½	3000	3¾x5¼	34x3½k	34x6k	W
Fageol....2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol....3½	3½	5000	4½x6¼	36x5k	40x5dk	W
Fageol....5	5	5700	4½x6¼	36x6	40x6d	W
Fargo....R	2	1700	3¾x5	36x4	36x6	I
Federal....SD	1½	1800	3¾x5	35x5n	36x6n	W
Federal....TE	1½	2175	4½x5¼	36x3½	36x5	W
Federal....UE	2-2½	2425	4½x5¼	36x4	36x7	W
Federal....WE	3½-4	3150	4½x5½	36x5	36x5d	W
Federal....X2	5-6	4500	4¾x6	36x6	40x6d	W
*Ford....TT	1	430	3¾x4	30x3½n	32x4½n	W
Front Drive....C	1½	2800	3¾x5½	5	4	W
G & J**....20	1	2275	3⅝x5⅜	34x5n	34x5n	W
G & J**....A	2-2½	3375	4x5¼	36x4	36x7	W
G & J**....B	3½-4	4475	4½x5½	36x5	36x10	W
G.M.C....K16	1	1295	3½x5½	34x5n	34x5n	B
G.M.C....K-41A	2	2375	4 x5½	36x4k	36x7k	W
G.M.C....K-41B	2	2375	4 x5½	36x4k	36x7k	W
G.M.C....K-71A	3½	3600	4½x6	36x5	40x5d	W
G.M.C....K-71B	3½	3700	4½x6	36x5	40x5d	W
G.M.C....K-101A	5	3950	4½x6	36x5	40x6d	W
G.M.C....K-101B	5	4050	4½x6	36x5	40x6d	W
G.W.W	1½	1850	3¾x5½	35x5	35x5	I
*Garford....15	¾	1590	3⅝x5½	34x5n	34x5n	W
Garford....25-B	1¼	1990	3¾x5½	36x6n	36x6n	W
Garford....70-H	2	2750	4¼x5½	36x4	36x7	W
Garford....77-D	3½	3750	4½x6	36x5	36x6d	W
Garford....68D	5	4500	5 x6½	36x6	40x6d	W
Garford....150-A	7½	5200	5½x6	36x6	40x7d	C
Gary....F	1-1½	1675	3¾x5	36x3½	36x4	W
Gary....I	2	2250	4 x5½	36x3½	36x6	W
Gary....J	2½	2650	4¼x5½	36x4	36x8	W
Gary....K	3½	3650	4½x6	36x5	40x5d	W
Gary....M	5	4100	5 x6½	36x6	40x6d	W
Gersix....M	1½	3100	4 x5½	36x3½	36x7	W
Gersix....K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Graham Bros....	1	1265	3⅞x4½	33x4½n	34x5n	B
Graham Bros....	1½	1325	3⅞x4½	33x4½n	36x6n	B
1Gramm-Pion. 10	1	1365	3½x5	33x5n	33x5n	B
1Gramm-Pion. 15	1½	1900a	3¾x5	36x3½k	36x5k	I
1Gramm-Pion. 65	1½	2500a	3¾x5	36x3½k	36x5	W
1Gramm-Pion. 20	2	2925a	4½x5¼	36x4k	36x7k	W
1Gramm-Pion. 30	3	3275a	4¼x5½	36x4k	36x4dk	W
1Gramm-Pion.75P	3½	$4225a	4½x5½	36x6n	42x9n	W
1Gramm-Pion. 40	4	3995a	4½x5½	36x5	36x5dk	W
1Gramm-Pion. 50	5-6	4895a	4¾x6	36x6	40x6dk	W
Hahn....B2	1	....	3½x5	34x5k	34x5k	W
Hahn....O	1½	....	3¾x5¼	36x3½k	36x6k	W
Hahn....K	2	....	4¼x5½	36x7k	36x8k	W
Hahn....L	3	....	4½x5½	36x5k	36x8k	W
Hahn....M	5	....	4½x5½	36x5	36x10	W
Hahn....N	6	....	4¾x6	36x6	40x12	W
Hal-Fur....E	1½	2350	4x5¼	34x5n	38x7n	W
Hal-Fur....B	2½	3000	4¼x5½	36x6n	36x8	W
Hal-Fur....F	3½	4000	4½x5½	36x6n	40x10	W
Hall....1½	1½	3100	3¾x5	34x5n	38x7n	W
Hall....2½	2½	3275	4½x5¼	36x4	36x6	W
Hall....3½	3½	4100	4½x5½	36x5	36x5d	W
Hall....5	5	5100	4½x5½	36x5	40x6d	W
Hall....7 chain	7	5100	4½x5½	36x5	40x6d	C
Harvey....WOA	2	2650	4¼x5½	34x4	34x7	W
Harvey....WFA	2½	2950	4¼x5½	36x4	36x7	W
Harvey....WHA	3½	3050	4½x6	36x5	36x5d	W
Hawkeye....K	1½	1850	3⅜x5½	34x3½k	34x5k	I
Hawkeye....M	2	2650	4¼x5	36x4k	36x6k	I
Hawkeye....N	3½	3700	4½x6¾	36x5k	36x10k	I
Hendrickson....O	1½	2200	3⅝x5½	36x4n	36x5n	W
Hendrickson....N	2½	2690	4¼x5¾	36x4k	36x7k	W
Hendrickson....M	3½	3000	4½x5	36x5k	36x5dk	W
Hendrickson....K	5	4000	5 x6¼	36x6	40x6	W
Hurlburt....A	1½	2850	4 x5½	34x4	34x5	W
Hurlburt....B	2½	3750	4¼x5½	36x4	36x4d	W
Hurlburt....C	3½	4500	4½x6	36x5	36x5d	W
Hurlburt....D	5	5500	4½x6	36x5	40x6d	W
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	I
Indep'd't(Iowa).G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.) .HI	2½	2940	4¼x5¼	36x4	36x4	I
Indep'd't(Ohio) .F	1½	2385	3¾x5	36x3½	36x5	W
Indep'd't(Ohio) H	2½	3085	4¼x5¼	36x4	36x4d	W
Indep'd't(Ohio) K	3½	3985	4½x5½	36x5	36x5d	W
Indiana....12	1½	....	3¾x5¼	34x3½k	34x5k	W
Indiana....20	2	....	4¼x5½	36x4k	36x7k	W
Indiana....25	2½	....	4¼x5½	36x4k	36x8k	W
Indiana....35	3½	....	4⅝x5½	36x5k	36x5dk	W
Indiana....51	5	....	5 x6¾	36x5k	40x6dk	W
*International....S	¾	1500	3½x5	34x5n	34x5n	I
International....21	1	1750	3½x5¼	36x3½	36x3½	I
International....31	1½	1850	3½x5¼	36x3½	36x4	I
International....41	2	2100	3½x5¼	36x3½	36x5	I
International....61	3	2400	4¼x5	36x4	36x6	I
International..101	5	3600	4¼x5	36x5	40x10	I
Jackson....4WD	3½	3850	4½x5½	36x7	36x7	B
Jumbo....15	1½	2295	3¾x5¼	36x3½	36x5	I
Jumbo....20	2	2520	3¾x5¼	35x5n	38x7n	I
Jumbo....25	2½	2660	4½x5½	36x4	36x7	I
Jumbo....30	3	3060	4¼x5½	36x6n	42x9n	I
Jumbo....35	3½	3900	4½x6	36x5	36x10n	I
Jumbo....40	4	4400	4½x6	38x7n	44x10	I
K-Z....1	1	1750	3½x5	34x3½	34x5	W
K-Z....1½	1½	2075	3¾x5	36x4	36x6	W
K-Z....2½	2½	2550	4¼x5¼	36x4	36x8	W
K-Z....3½	3½	3350	4½x5½	36x5	40x10	W
K-Z....5	5	3850	4½x5½	36x6	40x6d	W
Kalamazoo....T	1	1295	4 x5	34x5	34x5n	B
Kalamazoo....G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo....LG	2	2645	4 x5	36x4	36x7	W
Kalamazoo....NH	3	3145	4 x6	36x5	36x10	W
Kalamazoo....HD	3	3350	4½x6	36x5	36x10	W
Kalamazoo....LK	4	3845	4½x6	36x5	36x12	W
Kalamazoo....OK	5	4350	4½x6	36x6	40x6d	W
2Kelly-S....K-31	1½	2700	3¾x5¼	36x3½	36x6	C
2Kelly-S....K-34	1½	2700	3¾x5¼	36x3½	36x6	W
2Kelly-S....K-38	2½	2900	3¾x5¼	36x4	36x4d	W
2Kelly-S....K-35	2½	2900	3¾x5¼	36x4	36x4d	C
2Kelly-S....K-40	3½	3900	4½x6½	36x5	40x5d	C
2Kelly-S....K-41	3½	3900	4½x6½	36x5	36x10	I
2Kelly-S....K-42	3½	3900	4½x6½	36x5	40x5d	W
2Kelly-S....K-50	5	4400	4½x6½	36x6	40x6d	C
2Kelly-S....K-60	6	4600	4½x6½	36x6	40x7d	C
Keystone....40	2	2175	3¾x5⅛	34x5n	38x7n	I
Kimball....AB	2	3675	4 x6	36x4	36x7	W
Kimball....AC	2½	3975	4¼x6	36x4	36x8	W
Kimball....AK	3	4500	4½x6	36x4	36x10	W
Kimball....AE	4	5000	4¾x6	36x5	40x12	W
Kimball....AF	5	5500	5 x6	36x6	40x7d	W
*Kissel....Express	1	1535	3⅞x5½	34x5n	34x5n	W
Kissel....Utility	1½	1975	3⅞x5½	36x3½	36x5	W
Kissel....Freighter	2½	2875	4¼x5½	36x4	36x7	W
Kissel....H. D.	4	3675	4¼x5½	36x5	36x5d	W
Kleiber....AA	1	2200	4¼x5¼	34x3½k	34x5k	W
Kleiber....A	1½	3100	4¼x5¼	36x3½k	36x6k	W
Kleiber....BB	2	3600	4¼x5¼	36x4k	36x7k	W
Kleiber....B	2½	3950	4½x5½	36x5k	36x8	W
Kleiber....C	3½	4600	4½x5½	36x5	36x5d	W
Kleiber....D	5	5300	5 x6½	36x6	40x12	W
Koehler....D	1½	2150	3½x5	34x3½	34x5	W
Koehler....M	2½	3175	4 x5½	36x4	36x7	W
Koehler....MCS	2½	3275	4 x5⅛	36x4	36x7	W

FINAL DRIVE:—B—Bevel, C—Chain, D—Double Reduction, I—Internal Gear, W—Worm.
r—8 cyl. s—6 cyl. t—2 cyl.—all others are 4 cyl. d—dual tires. k—pneumatic tires optional at extra cost. n—pneumatic tires. a—price includes several items of equipment. b—price includes body. *—speed truck or delivery wagon. **—Canadian Make. trac.—tractor.

1—Gramm-Pioneer. 2—Kelly-Springfield.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Koehler.....F	3½	$4470	4½x5½	36x5	36x10	W
Koehler,MT. Trac	5	3275	4 x5½	36x4	36x7	W
Krebs-Collier..23	¾	1260	3¾x5	34x4½	34x4½	B
Krebs-Collier..24	1	1565	3¾x5	34x5	34x5	W
Krebs-Collier..45	1½	2125	4¼x5¼	36x4	36x7	W
Krebs-Collier..75	2½	2375	4½x5½	36x4	36x8	W
Krebs-Collier.110	3½	2975	4½x5½	36x5	40x10	W
Larrabee.....X-2	1	1925	3¼x4½	34x5n	34x5n	B
Larrabee.....U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee.....J	1½–2½	2400	3¾x5	34x3½k	34x5k	W
Larrabee.....K	2½	3100	4½x5¼	36x4	36x7	W
Larrabee.....K-5	2½–3	3450	4½x5½	36x4	36x8	W
Larrabee.....L-4	3½	4000	4½x5½	36x5	36x5-l	W
Larrabee.....W	5	4800	4¾x6	36x6	40x6d	W
Maccar.....L	1½	2700	4⅛x5¼	36x4	36x6	W
Maccar.....H-A	2	3400	4⅛x5¼	36x4	36x4d	W
Maccar.....H-2	3	3400	4½x5½	36x4	36x5d	W
Maccar.....H-3	4	4200	4½x5½	36x5	36x6d	W
Maccar.....G	5-6	4950	4¾x6	36x5	40x6d	W
MacDonald.....A	7½	5750	4½x6	40x7	40x14	I
Mack...AB D.R.	1½	3150	4 x5	36x4	36x3½d	D
Mack...AB Chain	1½	3000	4 x5	36x4	36x3½d	C
Mack...AB Chain	2	3300	4 x5	36x4	36x4d	C
Mack....AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack....AB D.R	2½	3850	4 x5	36x4	36x4d	D
Mack...AB Chain	2½	3400	4 x5	36x4	36x4d	C
Mack...AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack...AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack...AC Chain	6½	5750	5 x6	36x6	40x12	C
Mack...AC Chain	7½	6000	5 x6	36x7	40x7d	C
Mack Trac....AB	5	3400	4 x5	36x4	36x4d	C
Mack Trac....AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac....AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac....AC	13	5750	5 x6	36x6	40x12	C
Mack Trac....AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf...AA**	2	3775	4 x5¼	36x4	36x7	W
Mapleleaf...BB**	3	4350	4¼x5½	36x4	36x4d	W
Mapleleaf...CC**	4	5100	4½x5½	36x5	36x5d	W
Mapleleaf...DD**	5	6200	4½x5½	36x6	40x6d	W
Master.....JW	1½	2290	4⅛x5½	34x3½	34x5	W
Master.....JD	1½	2590	4⅛x5½	34x3½	34x5	D
Master.....Z	2	2290	4½x5½	34x3½	34x5	W
Master.....W	2½	2890	4¼x5½	34x4	36x7	W
Master.....DD	2½	3190	4¼x5½	34x4	36x7	D
Master.....A	3½	3990	4½x6	36x5	40x5d	W
Master.....E	3½	4290	4½x6	36x5	40x5d	D
Master.....Y	4	4490	4½x6	36x5	40x6d	D
Master.....B	5	4990	4¾x6½	36x6	40x6d	W
Master.....F	5	5090	4¾x6½	36x6	40x6d	D
MasterTrac,DDT	6	3390	4¼x5½	34x4	36x7	D
*Maxwell.....XX	1½	932	3⅝x4½	32x3n	32x4n	W
Menominee...HT	1–1¼	2000	3¾x5	34x3½	36x5	W
Menominee....H	1½	2475	4 x5	36x3½	36x5	W
Menominee....D	2–2½	2875	4 x6	36x4	36x8	W
Menominee....G	3½	3800	4½x6	36x5	36x10	W
Menominee...J-3	5	4250	4¾x6	36x6	40x12	W
Moline.....10	1½	1985	3½x5	34x5n	36x6n	I
3Moreland..R. R.	1	1595	4 x5	34x5n	34x5n	B
Moreland.....BX	1½	1080	4 x5	30x3½	30x6k	W
Moreland.....EX	2	2800	4½x5½	36x4	36x7k	W
Moreland.....AX	3	3500	4½x5½	36x5	36x10k	W
Moreland.....RX	4½–5	4600	4¾x6	36x6	40x6	W
Nash.....2018	1–1½	1595	3¾x5¼	35x5	36x6	I
Nash.....3018	2–2½	2150	3¾x5¼	36x6	40x8	I
Nash.....Quad.	2–2½	2750	4¼x5½	40x8	40x8	I
Nash..3018, LWB	2–2½	2200	3¾x5¾	36x6	40x8	I
Nash..Quad. LWB	2–2½	2800	4¼x5½	40x8	40x8	I
Nash.....5018	2½	2250	3¾x5¼	34x4	34x6	I
4Nelson.....G2	1½	....	4½x5¼	36x3½	36x6	W
4Nelson.....G3	2½	....	4½x5¼	36x4	36x7	W
4Nelson.....G4	3½	....	4½x5½	36x5	36x5d	W
4Nelson.....G5	5	....	4¾x6	36x6	40x6d	W
Netco.....DK	2	3100	4¼x5¼	36x4k	36x7k	W
Netco.....HL	2½	3500	4½x5½	36x4k	36x8k	W
Niles.....E	2	3000	4½x5½	36x4k	36x7k	W
Noble.....B30	1½	....	3¾x5¼	36x3½	36x5	W
Noble.....C40	2	....	4 x5½	36x4	36x7	W
Noble.....D50	2½	....	4¼x5½	36x4	36x8	W
Noble.....E70	3½	....	4½x6	36x5	36x10	W
Northwestern..W	1½	2700	4½x5¼	34x4	36x6	W
Northwestern.WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk.....25E	1	1595	3½x5	34x3½	34x4	W
Norwalk.....35E	1½	1925	3½x5	34x3½	34x3½d	W
Norwalk,35E-Spec	1½	2285	3¾x5¼	34x3½	34x5	W
Ogden.....A2	1	....	3½x5	34x5n	34x5n	W
Ogden.....D	1½	....	3¾x5	36x3½	36x5	W
Ogden.....E	2½	....	4½x5¼	36x4	36x8	W
Old Hickory...W	1	1775	3¾x5	36x3½k	36x4k	W
Old Reliable....A	1½	2350	4 x5	34x4	36x6	W
Old Reliable....B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable....C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable....D	5	5250	4¾x6	36x6	40x6d	W
Old ReliableKLM	7	6000	4¾x6¼	36x6	40x7d	C
*Oldsmobile Econ	1	$1095	3½x5¼	35x5n	35x5n	I
Olympic.....A	2½	3200	4¼x5½	36x4	36x8	W
Oneida.....B9	1½	2825	4 x5¼	36x3½	36x7	
Oneida.....C9	2½	3200	4 x5¼	36x4	36x8	
Oneida.....D9	3½	4050	4½x5½	36x5	36x10	
Oneida.....E9	5	4725	4½x5½	36x6	40x12	
Oshkosh.....A	2	3250	3½x5	36x6n	36x6n	B
Oshkosh.....AA	2	3400	3½x5	36x6n	36x6n	B
Oshkosh.....B	2½	3850	4 x5⅛	38x7n	38x7n	B
Oshkosh.....BB	2½	4000	4 x5⅛	38x7n	38x7n	B
*Overland.....4	½	450	3⅝x4	30x3½n	30x3½n	B
Packard.....EC	1½–3	3100	4⅛x5½	36x4	36x7	W
Packard.....EX	1½–3	3100	4⅛x5½	36x6n	40x8n	W
Packard.....ED	2–4½	4100	4½x5½	36x5	36x5d	W
Packard.....EF	4–7½	4500	5 x5½	36x6	40x6d	W
Paige.....52-19	1½	1950	4 x5¼	34x3½	34x5	W
Paige.....54-20	2½	2120	4¼x5½	31x4	34x8	W
Paige.....51-19	3½	3145	4½x5½	36x5	36x5d	W
Parker.....C-22	1	1875	3¾x5¼	34x5n	34x5n	W
Parker.....G-22	2½	3200	4¼x6	34x4	36x4d	W
Parker.....J-20	3½	3950	4½x6	36x5	40x5d	W
Parker.....M-20	5	4850	5 x6	36x6	40x6d	W
Patriot...Revere	1	1380	3¾x5	35x5n	35x5n	W
Patriot...Lincoln	2	2050	4 x5¼	34x3½	34x5	W
Patriot .Washgt'n	3	2900	4½x5½	36x4	36x7	W
Pierce-Arrow....	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow....	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow....	5	4850	4½x6¾	36x5	40x6d	W
Pittsburgher....	1½–2	3000	3⅝x5	36x4	36x6	..
Pittsburgher....	3	3800	4½x5½	36x5k	36x8	W
Power.....F	2	3150	3¾x5¼	36x5	36x7	W
Power.....C	3½	4250	4½x5½	36x5	40x10	W
*Rainier.....R-21	¾	....	3½x5	35x5n	35x5n	W
Rainier.....R-29	1	....	3¾x5	34x3½	34x4	W
Rainier.....R-26	1½	....	3¾x5	34x3½	31x5	W
Rainier.....R-28	2	....	4½x5¼	34x4	34x6	W
Rainier.....R-20	2½–3	....	4½x5¼	34x4	34x7	W
Rainier.....R-15	3½–5	....	4½x5½	36x5	36x5d	W
Rainier.....R-17	5–6	....	4¾x6	36x6	40x6d	W
Ranger...TK-20-2	1½	2450	3¾x5	36x6n	38x7n	W
*Reo.....F	¾–1½	1245	4½x4½	31x4½n	34x4½n	B
Reliance.....10A	1½	2400	4 x5¼	36x3½	36x5	I
Reliance.....20B	2½	3100	4¼x5½	36x4	36x4d	I
Republic.....75	¾	1395b	3½x5	32x4½n	32x4½n	I
Republic.....10	1	1395	3¾x5	34x3	34x4	I
Republic..10 Exp	1	1695	3¾x5	35x5n	34x5n	I
Republic.....11X	1½	1795	3¾x5	34x3½	34x6	I
Republic.....19	2½	2195	4½x5¼	36x4	36x7	I
Republic.....20	3½	3095	4½x5½	36x5	36x10	I
Rowe.....CW	1½	3000	3¾x5	36x6n	36x6n	W
Rowe....C.D.W.	2	3300	4 x5	34x4	36x3½d	W
Rowe....G.S.W.	3	4150	4 x6	34x5	36x5d	W
Rowe....G.P.W.	3	5250	3¼x5r	38x7n	42x9n	W
Rowe.....HW	4	4500	4¼x6	36x5	36x6d	W
Rowe.....F. W.	5	5500	4½x6	36x6	40x6d	W
Ruggles.....20	1	1195	3¾x5	34x5n	34x5n	B
Ruggles.....40	2	1795	4 x5	34x5n	34x7	D
Sanford W-15	1½	2150b	3¾x5	36x3½k	36x5k	..
Sanford.....25	2½	....	4½x5¼	36x4	36x4d	W
Sanford.....35	3½	....	4½x5½	36x5	36x5d	W
Sanford.....50	5	....	4¾x6	36x5	40x6d	W
Schacht....2-Ton	2	3200	4¼x5½	36x4	36x7	W
Schacht....3-Ton	3	3800	4¼x5½	36x5	36x5d	W
Schacht....4-Ton	4	4200	4½x6	36x5	40x5d	W
Schacht....5-Ton	5	4400	4½x6	36x5	40x6d	W
Schacht....7-Ton	7	5050	4½x6	36x6	40x7d	W
Schwartz.....A	1	1685	3½x5	34x4½n	34x4½n	B
Schwartz.....K	2	3000	3¾x5¼	34x3½	34x7	W
Schwartz.....L	3	3600	4¼x5½	36x4	36x8	W
Schwartz.....M	5	4900	4½x6	36x6	40x12	W
Selden.....30	1½	2250	3¾x5	34x3½	34x5	W
Selden.....31	1½–2½	3350	4¼x5½	34x5	38x7	W
Selden.....50	2½	3250	4½x5¼	36x4	36x7	W
Selden.....51	2½–3½	4350	4½x5½	36x6n	40x8n	W
Selden.....70	3½–5	3750	4½x5½	36x5	36x10	W
Selden.....90	5–7	4950	4¾x6	36x6	40x12	W
Seneca.....M	½	820	3½x4½	30x3½n	30x3½n	B
*Service.....12	¾	....	3¼x4½	32x4½n	32x4½n	B
*Service.....15	1½	....	3⅝x5	34x4½n	35x5n	B
Service.....21	1½	....	3½x5½	34x3½	34x5	W
Service.....32	2	....	4 x5½	36x3½	36x7	W
Service.....37	2	....	4¼x5½	35x5n	38x7n	W
Service.....52	3	....	4¼x5½	36x4	36x8	W
Service.....72	3½	....	4¼x5½	36x5	36x5d	W
Service.....77	4	....	4½x6	36x5	36x5d	W
Service.....102	6	....	4½x6	36x6	40x6d	W
Signal.....NF	1	$1950	3¾x5	34x5n	36x6n	W
Signal.....H	1½	2450	4½x5¼	34x4	36x6	W
Signal.....J	2½	2875	4½x5¼	34x4	36x8	W
Signal.....M	3½	3675	4½x5½	36x5	40x5d	W
Signal.....R	5	4400	4¾x6	36x6	40x6d	W
Southern.....10	1	2090	3¾x5	34x3½	34x4	W
Southern.....15	1½	2590	3¾x5⅛	36x6n	34x4	W
Southern.....20	2	2990	4¾x5¼	36x6n	40x8k	W
Standard....1-K	1½	1600	3¾x5	34x3½k	34x5k	W
Standard.....76	2½–3	2400	4½x5¼	36x4k	36x7k	W
Standard.....66	3½–5	3150	4½x5½	36x5	36x10	W
Standard.....5-K	5–7	4400	4¾x6	36x6	40x12	W
Sterling.....1½	1½	2885	4 x5¼	36x3½k	36x5k	W
Sterling.....2	2	3085	4 x5¼	36x4k	36x6k	W
Sterling.....2½	2½	3290	4⅛x5¾	36x4k	36x4dk	W
Sterling.....3½	3½	4325	4½x6¼	36x5k	40x5dk	W
Sterling.....S-W	5	4950	5 x6¼	36x6	40x6d	W
Sterling.....5-C	5	5500	5 x6¼	36x6	40x6d	C
Sterling.....7½	7½	6000	5 x6¼	36x6	40x7d	C
*Stewart.....14	¼–1½	1245	3⅝x5⅛	34x4½n	34x4½n	I
Stewart.....15	1½–1½	1445	3⅝x5⅛	35x5n	35x5n	I
Stewart.....9	1½–2	1790	3¾x5	34x3½	34x5	I
Stewart.....7	2–2½	2190	4½x5¼	34x4	34x7	I
Stewart.....7-X	2½–3	2390	4¼x5½	34x4	34x7	I
Stewart.....10	3½–4	3190	4½x5½	36x5	36x5d	I
Stewart.....10-X	3½–4	3190	4½x6	36x5	36x5d	I
*Stoughton....C	¾	1240	3½x5	34x4½n	34x4½n	W
Stoughton.....A	1	1790	3¾x5¼	34x5	34x5	W
Stoughton.....B	1½	2150	3¾x5¼	36x3½	36x5	W
Stoughton.....D	2	2490	4 x5½	36x4	36x7	W
Stoughton.....F	3	3150	4¼x5½	36x5d	36x5d	W
Sullivan.....E	2	2800	4¼x5½	36x4k	36x7k	W
Sullivan.....H	3½	3750	4½x6	36x5	36x5d	W
*Thomart.....	1¼	1795a	4 x5¼	34x5	34x5	C
Tiffin.....GW	1½	2100	4½x5¼	36x3½	36x5	W
Tiffin.....MW	2½	2700	4½x5¼	36x4	36x3½d	W
Tiffin.....PW	3½	3600	4½x5½	36x5	40x5d	W
Tiffin.....F50	5	4300	4¾x6	36x6	40x6d	W
Tiffin.....F60	6	4500	4¾x6	36x6	40x12	W
Titan.....	2	2750	4 x5	36x4k	36x7k	D
Titan.....	2½	2950	4¼x5½	36x4k	36x8k	D
Titan.....	3½	3950	4½x6	36x5k	40x10k	D
Titan.....	5	4550	4½x6	36x5	40x12	D
Tower.....J	1½	2900	4½x5¼	35x5	38x7	W
Tower.....H	2½	3200	4½x5½	36x4	36x7	W
Tower.....G	3½	4100	4½x5½	36x5	36x5d	W
Traffic.....	1½	1595	3¾x5	35x5n	35x5n	I
Traffic.....C	2	1595	3¾x5	34x3½k	34x5k	I
Traffic.....	3	1895	3¾x5	36x4	36x7	I
*Transport....15	1	1295n	3¾x5	32x4½n	32x4½n	B
Transport.....25	1½	1495	3¾x5⅛	34x3½k	34x4k	I
Transport.....35	2	1835	3¾x5	36x3½k	36x6k	I
Transport.....55	3	2385	4½x5¼	36x4k	36x8k	I
Transport.....60	3½	2585	4¼x5½	36x4k	36x8k	I
Transport.....75	5	3485	4½x6	36x5k	36x12k	I
Traylor.....B	1½	2390	3¾x5½	34x3½	34x5	W
Traylor.....C	2–2½	2850	4 x5½	36x4	36x7	W
Traylor.....D	3–3½	3300	4¼x5½	36x4	36x8k	W
Traylor.....F	5–6	4700	4½x6	36x6	40x6d	W
*Triangle.....AA	1	1285	3½x5	34x4½n	34x4½n	I
Triangle.....A	1½–2	1985	3¾x5¼	34x3½k	34x6k	I
Triangle.....C	2–2½	2285	3¾x5¼	36x4k	36x6k	I
Triangle.....B	2½–3	2585	4 x5¼	36x4k	36x7k	I
Twin City...B.W.	2	2750	4 x5½	36x6	40x8	I
Twin City...A.W.	3½	3950	4¼x6	36x5	40x5d	W
5Twin City.....B	3½	....	5½x6	36x6	36x6	I
5Twin City.....A	5	....	5½x6	36x7	36x7	I
Ultimate.....A	2	3150	4 x5½	36x3½	36x6	W
Ultimate.....AJ	2	3200	4¼x5½	36x3½	36x6	W
Ultimate.....AJL	2	3250	4½x5½	30x3½	36x6	W
Ultimate.....B	3	3700	4¼x5½	36x4	36x4d	W
Ultimate.....BL	3	3800	4¼x5½	36x4	36x4d	W
Ultimate.....D	5	5500	5 x6½	36x6	40x12	W
Union.....FW	2½	3490	4 x6	36x5k	36x8k	D
Union.....HW	4	4650	4½x6	36x6	40x12	D
Union.....JW	6	5800	5 x6	36x6	40x14	D
United.....A	1½	2445	3¾x5¼	36x3½k	34x5k	W
United.....B	2½	3150	4¼x5½	36x4k	36x7k	W
United.....C	3½	3975	4¼x5½	36x5	36x5d	W
United.....V	5	4500	4½x6	36x6	40x6d	W
*United States..U	1	1875	3⅝x5⅛	34x5n	34x5n	B
UnitedStates,NW	1½	2225	3¾x5	36x5	36x3½	W
United States...N	1½	1975	3¾x5	36x3½k	36x5k	I
United States...R	3	3075	4 x5¼	36x4	36x4d	W
United States...S	4	3875	4½x5½	36x5	36x5d	W
United States...T	6	4850	4¾x6½	36x6	40x6d	W
Velie.....46	1½	1585	3¾x5	36x3½k	36x5k	I
Veteran.....M**	1½	2699	3¾x5¼	35x5n	35x5n	W
Veteran.....P**	2	3699	4¼x5½	36x4	36x7	W
Veteran.....R**	3	4200	4¼x5½	36x4	36x7	W
Veteran.....S**	4	5395	4½x6	36x5	36x10	W
*Vim.....29	½	1050	3½x4½	31x4n	31x4n	W
Vim.....30	½	1175	3½x4½	32x4½	32x4½	W
Vim.....31	1	1975	3¾x5½	35x5n	35x5n	W
Vim.....22	2	3150	3¾x5½	36x4	36x6	W
Vim.....23	3	3950	4¼x5½	36x5	36x5d	W

FINAL DRIVE:—B—Bevel, C—Chain, D—Double Reduction, I—Internal Gear, W—Worm.
r—8 cyl. s—6 cyl. t—2 cyl.—all others are 4 cyl. d—dual tires. k—pneumatic tires optional at extra cost. n—pneumatic tires. a—price includes several items of equipment. b—price includes body. *—speed truck or delivery wagon. **—Canadian Make. trac.—tractor.

3—Moreland Road Runner. 4—Nelson Le Moon. 5—Twin City Four Wheel Drive.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Walker-JohnsonA	2	$2250	3⅜x5	34x3½	34x6	W
Walker-JohnsonB	3	2750	4¼x5½	36x4	36x8	W
Walter.....S	5	4850	4½x6¼	36x6	40x6d	W
*Watson.....B	1	1865a	3¾x5¼	35x5n	35x5n	W
Watson.....N	3½	4250	4½x5½	36x5	36x10	W
Western....W1½	1½	2550	4⅛x5¼	36x3½k	36x5k	W
Western....L1½	1½	2550	3¾x5	36x3½k	36x5k	W
Western....W2½	2½	3250	4⅛x5¼	36x4	36x7	W
Western....L2½	2½	3250	4¼x6	36x4	36x7	W
Western....W3½	3½	4250	4½x6	36x5	40x5d	W
*White.....15	¾	2400	3¾x5½	34x5n	34x5n	B
White.....20	2	3250	3¾x5½	36x4k	36x7	D
White.....40	3½	4200	3¾x5¾	36x5	40x5d	D
White.....45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick....E	1	1225	3¾x5	34x5n	34x5n	W
White Hick....H	1½	1375	3¾x5	36x3½	36x5	W
White Hick....K	2½	1675	4⅛x5¼	36x4	36x5	W
Wichita.....K	1	1875	3¾x5¼	36x3½	36x4k	W
Wichita.....M	2	$2400	3¾x5¼	36x3½k	36x6k	W
Wichita.....RX	3	3200	4⅜x5¾	36x4k	36x8k	W
Wichita.....O	4	3500	4½x6¼	36x5k	36x5k	W
Wilcox.....AA	1	1900	3¼x5½	36x4k	36x4k	W
Wilcox.....BB	1½	2550	4¼x5	36x4	36x5	W
Wilcox.....D	2½	3000	4¼x5	36x4k	36x3½dk	W
Wilcox.....E	3½	3950	4½x6	36x5k	36x5dk	W
Wilcox.....F	5	$4350	4¾x6½	36x5	40x6d	W
Wilson.....F	1½	2270	3¾x5	36x3½	36x5	W
Wilson.....EA	2½	2825	4½x5¼	36x4	36x7	W
Wilson.....G	3½	3685	4½x5½	36x5	36x5	W
Wilson.....H	5	4520	4½x6	36x6	40x6	W
*Wisconsin....A	1	1750	3¾x5	34x5n	34x5n	W,B
Wisconsin....B	1½	2100	3¾x5	35x5	36x6	W
Wisconsin....C	2½	2700	4 x5¾	36x6n	36x7	W
Wisconsin....D	3½	3000	4⅜x5¾	36x6n	40x8	W
Wisconsin....E	5	3500	4½x6¼	36x6	36x10	W
Wisconsin....F	7	4000	5 x6¼	36x6	36x12	W
Witt-Will.....N	1½	2250	3¾x5	36x3½k	36x5k	W
Witt-Will.....P	2½	2750	4⅛x5¼	36x3½k	36x7k	W
Wolverine.....J	1	2125	3½x5	34x3	34x4	I
Wolverine.....J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine.....J	2½	3425	4½x5¼	36x5	36x10	I
Wolverine.....L	3½	4100	4½x5½	36x5	36x10	I

FINAL DRIVE:—B—Bevel, C—Chain, D—Double Reduction, I—Internal Gear, W—Worm.
r—8 cyl. s—6 cyl. t—2 cyl.—all others are 4 cyl. d—dual tires. k—pneumatic tires optional at extra cost. n—pneumatic tires. a—price includes several items of equipment. b—price includes body. *—speed truck or delivery wagon. **—Canadian Make. trac—tractor.

Specifications of Current Farm Tractor Models

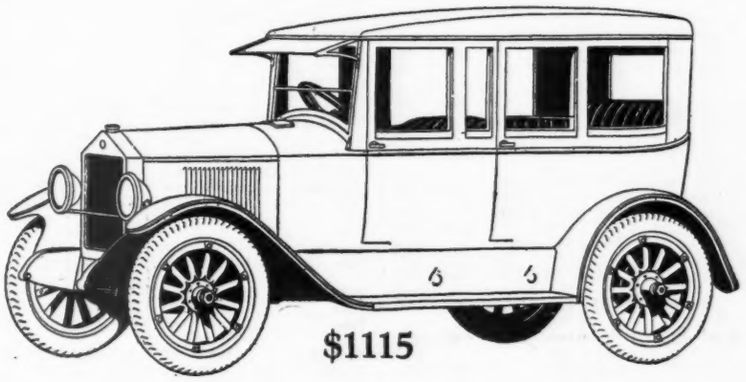
TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
Allis-Chal.G.P	6-12	$250	2	LeR.	4-3⅛x4½	Gas.	1
Allis-Chalm..B	6-12	325	2	LeR.	4-3⅛x4½	G	1
Allis-Chalm...	15-25	1185	4	Midw.	4-4⅛x5¼	Gas.	3
Allis-Chalm...	20-35	1885	4	Own	4-4¾x6½	GorK	3-4
‡Allis-Chalm.	20-35	2085	4	Own	4-4¾x6½	G	4
Allwork...2-G	14-28	1695	4	Own	4-4¾x6	GorK	3
Allwork.....C	14-28	1395	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
ARO..1921-22	3-6	385	4	Own	1-4½x5	Gas.	1
Aultman-T....	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T....	22-45	3420	4	Own	4-5½x8	G,K	6
Aultman-T....	30-60	4500	4	Own	4-7 x9	G,K,D	8-10
Automot. B-3.	12-24	1250	4	Herc.	4-4 x5½	Gas.	2-3
Avery,SR.Cul.	5-10	....	4	Own	4-3 x4	G,K	..
Avery..Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery.....B	5-10	....	4	Own	4-3 x4	G,K	2
Avery.....C	....	....	4	Own	6-3 x4	G,K	..
Avery.....	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery.....	12-20	....	4	Own	4-4½x6	G,K,D	3-4
Avery.....	....	....	*	Own	4-4x5½	G,K,D	3
§Avery.....	....	....	4	Own	2-6½x7	G,K,D	3-4
Avery.....	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery.....	14-28	....	4	Own	4-4⅝	G,K,D	3-4
Avery.....	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery.....	25-50	....	4	Own	4-6½x7	G,K,D	5-6
Avery.....	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates Mule.H	15-25	....	4	Midw	4-4⅛x5¼	Gas.	3
Bates Mule..F	18-25	....	*2	Midw	4-4⅛x5½	Gas.	3
‡Bates MuleG	25-35	....	*2	Midw	4-4½x6	Gas.	..
Beeman,....G	2-4	240	4	Own	1-3½x4½	Gas.	....
Best.....	18-30	3101	*2	Own	4-4¾x6½	G,K,D	4
Best.....	60	5452	*2	Own	4-6½x8½	G,K,D	5-9
Boring.....	5-10	395	4	LeR.	4-3½x4½	G	..
Boring...1921	....	1850	3	Wauk	4-4¾x5¼	GorK	2
Burn-Oil, 1922	15-30	1435	4	Own	2-6¾x7	Ker.	3-4
Capital.....	15-30	1000	2	Own	4-4⅝x6	Gas.	3
Case.....	10-18	700	4	Own	4-3⅞x5	GorK	2
Case.....	12-20	1050	4	Own	4-4½x5	G,K,D	3
Case.....	15-27	1320	4	Own	4-4½x6	GorK	3-4
Case.....	22-40	2550	4	Own	4-5½x6¾	GorK	4-5
Case....40-72	40-72	5200	4	Own	7 x8	G,K,D	8-10
Caterpillar .5T	25	....	*2	Own	4-4¾x6	Gas.	4
Caterpillar 10T	40	....	*2	Own	4-6½x7	Gas.	6
Caterpillar T35	15-25	....	2	Own	4-4 x5½	Gas.	3
Centaur.....	5-21½	345	2	N Way	2-4½x4½	GorK	1
Chicago....40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac.....F	9-16	595	*2	Own	4-3¼x4½	G,K,D	2
Cletrac.....W	12-20	1345	*2	Own	4-4 x5½	G,K,D	2-3
Dakota.....4	15-27	1500	3	Dom.	4-4¾x6	Gas.	3
Depue.....A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill.....D	20	2380	4	Cont.	4-4½x5½	Gas.	3
Dill.....R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3
Do-It-All....A	3-6	495	..	Own	1-4½x5	Gas.	1
Eagle.....F	12-22	....	4	Own	2-7 x8	GorK	3-4
Eagle.....H	16-30	....	4	Own	2-8 x8	G or K	4-5
E-B.....AA	12-20	1095	4	Own	4-4¾x5	G,K,D	3
Fageol.....D	9-18	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse.B	18-30	1885	4	Clim.	4-5 x6½	G,K	4
Farquhar....	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar.....	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar.....	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch..4 Drive	20-35	1850	4	Clim.	4-5 x6½	GorK	3-4
Fordson.....	-18	$ 395	4	Own	4-4x5	G,K	2
Fox.....E	20-40	2390	4	Own	4-5½x7½	G or K	4
Franklin....G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin....C	18-30	3350	*2	Clim.	4-5 x6½	G or K	3-4
Franklin...G2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick.....A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick.....C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
Grain Belt...A	18-36	2150	4	Wauk.	4-4¾x6¾	G or K	4
Gray.....1920	18-36	....	3	Wauk	4-4¾x6¾	Gas,	4
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K	4
Hart-Parr..20	20	765	4	Own	2-5¼x6½	K.D.	2
Hart-Parr...30	30	895	4	Own	2-6½x7	K.D.	3
‡Hart-Parr....	....	1695	4	Own	6½x7	K.D.	..
Heider.....D	9-16	870	4	Wauk	4-4¼x5¾	G,K	2
Heider.....C	12-20	995	4	Wauk	4-4½x6¾	G,K	3
Heider....Cult	5-10	800	4	LeR.	4-3½x4½	Gas.	1
Huber Light 4.	12-25	1185	4	Wauk	4-4½x5¾	G or K	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas	3
Illinois,.....C	15-30	....	4	Clim.	4-5 x6½	G,K	4
Imperial....E	40-70	4500	4	Own	4-7½x9	G,K,D	10
Indiana.....F	5-10	665	2	LeR.	4-3½x4½	Gas.	1-2
International .	8-16	†670	4	Own	4-4¼x5	G,K,D	2
Internatl.Titan	10-20	†700	4	Own	2-6½x8	G,K,D	3
International..	15-30	1750	4	Own	4-5¼x8	G,K,D	4
J-T.....N	20-40	....	*2	Clim.	4-5x6½	G,K,D	3-4
Lauson.....5	12-25	1495	4	Midw.	4-4½x5¼	Gas.	3
Lauson.....20	15-25	1495	4	Beav.	4-4½x6	G or K	3-4
Lauson.....21	15-30	1875	4	Beav.	4-4¾x6	G or K	3-4
‡Lauson Road	15-30	2100	4	Beav.	4-4¾x6	K	....
Leader.....B	12-18	685	4	Own	2-6 x6¼	G,K,D	2-3
Leader.....N	16-32	1725	4	Clim.	4-5 x6½	G,K	3-4
‡Leader...GU	18-35	2150	*2	Clim.	4-5 x6½	G,K	3-4
Linn.....H4J	40-	4500	*	Cont	4-4½x5½	Gas	4
Linn.....W	60	5080	*	Wauk	4-5 x6¼	Gas	6
Little Giant, B	16-22	2200	4	Own	4-4½x5	K	4
Little Giant, A	26-35	3300	4	Own	4-5½x6	K	6
Lombard..1922	85-150	8950	*2	Wisc.	6-5½x6¾	Gas.	16
Lombard..1922	50	5300	*2	Wisc.	4-4¾x6½	Gas.	6-10
Master Jr.....	5-10	585	..	LeR.	-2¾x4	Gas.	1
MerryGar1922	2	210	2	Evin	1-2⅝x2½	Gas.	..
Minne...All-P	12-25	800	4	Own	4-4½x7	G or K	3
Minne. Gen.P	17-30	1600	4	Own	4-4¾x7	G or K	3-4
Minne. Med.D	22-44	2650	4	Own	4-6 x7	G or K	5-6
MinneHeavyD	35-70	3850	4	Own	4-7¼x9	G or K	8-9
Mohawk .1922	8-16	650	2	Light	4-3¼x4½	K or G	1-2
Moline Univ D	9-18	....	2	Own	4-3½x5	Gas.	2-3
Moline Orch..	9-18	....	2	Own	4-3½x5	Gas.	2-3
Motor Macult.	1½	195	2	Own	1-2¾x3½	Gas.	..
NB.....1	3-6	425	4	Own	2-3¾x4	Gas.	1
Nichols-Shep.	20-42	2650	4	Own	8 x10	G or K	3-6
Nichols Shep.	25-50	3000	4	Own	9 x12	G or K	4-7
Nilson Senior..	20-40	1975	5	Wauk	4-5 x6¼	G,K	4
Oil Pull.....K	12-20	....	4	Own	2-6 x8	K,D	3
Oil Pull.....H	16-30	....	4	Own	2-7 x8½	K,D	4
Oil Pull.....G	20-40	....	4	Own	2-8 x10	K,D	5-6
Oil Pull.....E	30-60	....	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	225	4	Own	1-5⅛x5½	Gas.	1
Oshkosh....M	6-12	650	2	Own	2-4 x6	G,K	1
Oshkosh....G	12-24	985	2	Own	2-6 x7	G,K	3
Peoria.....L	12-25	$1600	4	Clim.	4-5 x6½	G,K	3
Pioneer.....G	18-36	1750	4	Own	4-5½x6	G,K,D	4
Pioneer.....C	40-75	3550	4	Own	4-7 x8	Gas.	10
Plowman....A	15-30	1295	4	Buda	4-4½x6	G,K	3-4
Reliable.....	10-20	390	4	Own	2-6 x7	Ker.	2
Rex.....	12-25	1600	4	Wauk	4-4¼x5¾	G or K	3
Russell.....	12-24	1500	4	Own	4-4¼x5¾	G or K	2-3
Russell.....	15-30	2200	4	Own	4-5 x6½	G or K	3-4
Russell.....	20-35	3000	4	Own	4-5½x7	G or K	4-5
Russell.....	30-60	5000	4	Own	4-8 x10	G or K	8-10
Samson....M	....	445	4	Own	4-4 x5½	G,K	2
Sandusky....J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky....E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shelby.....D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby.....C	9-18	....	4	Wauk	4-3¾x5¼	G or K	2
Steady Pull..	12-24	1485	4	Own	4-4 x5	Gas.	3
Stinson....4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Tioga.....3	18-32	....	4	Wisc.	4-4½x6	Gas.	3-4
Topp-Stewart.	30-45	....	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6	750	3	LeR	4-3⅛x4½	Gas.	2
ToroTractor'22	6-10	495	3	LeR	4-3⅛x4½	Gas.	2
Townsend....	10-20	800	2	Own	4-6½x7	Ker.	2-3
Townsend....	15-30	1350	2	Own	4-7 x8	Ker.	3-4
Townsend....	25-50	2500	2	Own	4-8½x10	Ker.	4-8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4-5
Traylor....TB	6-12	500	4	LeR.	4-3½x4½	Gas.	1-2
Trundaar....10	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Twin City....	12-20	1200	4	Own	4-4¼x6	G,K	3
Twin City....	20-35	2750	4	Own	4-5½x6¾	G,K	5-6
Twin City....	40-65	4750	4	Own	4-7¾x9	G,K	8-10
Uncle Sam C20	12-20	1295	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1895	4	Beav.	4-4¾x6	G or K	3-4
Utilitor....501	2½-4	295	4	Own	1-3½x4½	G	1
Utilitor...501A	2½-4	340	4	Own	1-3½x4½	G	1
Vim.....B	15-30	1190	4	Wauk	4-4⅜x5¾	G,K	3
Wallis.....K	15-25	†995	4	Own	4-4¼x5¾	G,K	3
Waterloo....N	12-25	675	4	Own	2-6½x7	Ker.	3
Wetmore 21-22	12-25	1185	4	Wauk	4-4 x5¾	G,K	3
Whitney....D	9-18	595	4	Own	2-5½x6½	Gas.	2
Wichita.....T	15-30	2000	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin...E	16-30	1850	4	Clim.	4-5 x6½	G or K	3
Wisconsin...F	20-40	2050	4	Wauk	4-5 x6¼	G or K	4
Wisconsin,..H	22-40	2550	4	Clim.	4-5½x7	G or K	4-6
Yuba....12-20	12-20	2400	*2	Wisc.	4-4½x6¾	G,K,D	3
Yuba....15-25	15-25	2750	*2	Wisc	4-4¼x6	G,K,D	..
Yuba....20-35	20-35	3900	*2	Wisc.	4-5¾x7	G,K,D	4
Yuba....25-40	25-40	4250	*2	Wisc.	4-5¾x7	G,K,D	..
‡Yuba.....	25-40	4750	*2	Yuba	4-5¼x7	D	..
Zelle.....	12-25	....	4	Buda	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav.—Beaver. Clim.—Climax. Cont.—Continental. Dom.—Domas. Evin.—Evinrude. Herc.—Hercules. LeR.—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis.—Wisconsin. *—Crawler type. All others are wheel type. †Price includes plows. §Track Runner. ‡Industrial Tractor.

DORT

Quality Goes Clear Through

Consistently and persistently the sales of Dort Closed Cars continue to mount. Factory production has increased accordingly. April was 25 per cent over March, May beat April by another 25 per cent, and June was far ahead of May. The immediate success of the Dort Yale Sedan, $1115, the Coupe, $1065 and the other five fine models place a new value on the highly prized Dort franchise.



$1115

Six models from $885 to $1445; Light delivery car, $825; at Flint

Dort Motor Car Company, Flint

(1407)

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace.....F	G-B	4-3½x5	114	32x4	$1295	$1295	....	....	$2295
Ace.....L	H-S	6-3¼x5	117	32x4	2260	2260	....	....	3680
Ace.....C	Cont.	6-3⅝x5¼	123	33x4½	2975	2975	....	....	4500
Ambassador.....R	Cont.	6-3⅝x5¼	136	33x5	....	b4500	$4500	....	6500
American.....C	H-S.	6-3¼x5	127	33x4½	b1995	1850	1925	....	2695
Anderson.....Series 40	Cont.	6-3¼x4½	120	33x4	2195	1650	1795	$2450	2550
Apperson.....8-21-S	Own.	8-3¼x5	130	34x4½	....	2620	2645	3625	3695
Auburn.....6-51	Cont.	6-3¼x4½	121	32x4	1575	1575	1615	2275	2395
Bell.....4-32	H-S.	4-3⅛x5	114	31x—	1095	1095	....	....	....
Bell.....6-50	H-S.	6-3¼x5	124	32x4	1545	1545	....	....	....
Biddle.....B1 & B5	Buda.	4-3¾x5⅛	121	32x4	2950	b2950	....	3950	3950
Brewster.....91	Own.	4-4 x5½	125	32x4½	5000	5000	....	....	7000
Buick. 1922-31-35-36-37	Own.	4-3⅜x4¾	109	31x4	895	935	....	1295	1395
Buick.....1922-41-5-6-7	Own.	6-3⅜x4½	118	33x4t	1365	1395	....	1885	2165
Buick.....1922-48-9-50	Own.	6-3⅜x4½	124	34x4½	n1785	n1785	1585	2075	2375
Cadillac.....61	Own.	8-3⅛x5⅛	132	33x5	3100	3150	3150	d3375	4100
Case.....X	Cont.	6-3¼x4½	122	32x4½	....	1890	....	....	2790
Case.....V	Cont.	6-3½x5¼	126	34x4½	....	....	1935	2585	2990
Chalmers.....1922	Own.	6-3¼x4½	117	32x4	1345	1395	1495	1995	2295
Chalmers.....1922	Own.	6-3¼x4½	122	32x4	....	....	1495	....	....
Chandler.....Six	Own.	6-3¼x5	123	33x4	1595	1595	1695	2295	2395
Chevrolet.....490	Own.	4-3⅛x4	102	30x3½	525	525	....	850 k720	875
Chevrolet.....FB	Own.	4-3⅛x5¼	110	32x4	975	975	....	1575	1575
Cleveland.....41	Own.	6-3 x4½	112	32x4	1175	1195	....	1550	1595
Cole.....890	Nort.	8-3¼x4½	127¼	33x5	2485	b2485	2485	3185	3685
Columbia....Challenger	Rut.	6-3¼x5	115	32x4	....	1195	....	1995	1995
Columbia.....DeLuxe	Cont.	6-3¼x4½	115	32x4	1475	1475	....	2295	2350
Columbia.....Light Six	Cont.	6-3½x4¼	115	31x4	995	985	....	....	1395
Comet.....C-S3	Cont.	6-3½x5¼	125	33x4½	....	1985	2085	....	2985
Crawford.....22-6-60	Cont.	6-3½x5¼	122½	32x4	3000	3000	3000	....	4500
Daniels.....D-19	Own.	8-3½x5¼	132	34x4¼	a4350	b4350	4350	5250	5950
Davis.....71	Cont.	6-3¼x4¼	114	31x4	....	1195	....	....	....
Davis.....61-67	Cont.	6-3¼x4½	120	32x4	1595	1595	b1695	2095	2195
Dixie Flyer.....11-S-70	H-S.	4-3½x5	112	32x4	1175	1175	b1295	1545	1595
Dodge Brothers	Own.	4-3⅞x4½	114	32x4	850	880	....	1280 980b	1440
Dorris.....6-80	Own.	6-4 x5	132	33x5	....	b39 0	3950	4985b	5750
Dort.....19-14	D-Ly.	4-3½x5	108	31x4	885	885	....	1315 1065k	1445 1115k
Driggs	Own.	4-25⅝x4½	104	30x3½	1275	1275	....	....	1975
Duesenberg...Straight 8	Own.	8-27⅛x5	134	33x5	6500	6500	6750	7800	7800
Du Pont.....A	Own.	4-3⅛x5½	124	32x4½	3000	3200	....	3800	4000
Durant.....A-22	Cont.	4-3⅞x4¼	100	31x4	n890	890	....	1365	1365
Durant.....B-22	Anst.	6-3¼x4½	123½	32x4½	1600	1650	....	2250	2400
Earl.....40	Own.	4-3⅞x5¼	112	32x4	1485	1095	950u	....	1795
Elcar.....K-4	Lyc.	4-3½x5	118	33x4	1095	1095	n1095	1345	....
Elcar.....7-R	Cont.	6-3¼x4½	118	33x4	1395	1395	n1395	2065	2165
Elgin.....K-1	Falls.	6-3½x4¼	118	33x4	1345	1295	b1345	2195	2195
Essex	Own.	4-3½x5	108½	32x4	....	1095	....	1295	1895 1345k
Ford.....T	Own.	4-3¾x4	100	30x3½	r319	s348	u285	580	645
Franklin.....9-B	Own	6-3¼x4	115	32x4	1900	1950	u1750	2750	2850
Gardner.....T-R & G	Lyc.	4-3½x5	112	32x4	895	895	....	....	1595
Grant	Own.	6-3½x4½	116	32x4	1385	1385	....	1895	1945
Gray	Own.	4-3⅝x4	100	30x3½	....	490	....	....	760
H.C.S.....Series 3	Weid.	4-3⅝x5½	120	32x4½	2400	2400	....	2850	3150
Halladay.....4	Own.	4-3½x5	115	32x4	1095	1095	....	1990	2085
Halladay.....6	Own.	6-3½x5	115	32x4	1595	1595	....	2295	2395
Handley-Knight	Own.	4-4½x4½	125	32x4½	....	....	2650	3450	3450
Hanson.....30	Cont.	6-3½x4¼	112	31x4	....	995	....	....	....
Hanson Six.....60	Cont.	6-3¼x4½	121	32x4	1595	1595	1795	b2475	2585
Hatfield.....A-42	H-S.	4-3½x5	115	32x4	....	1315	b1345	1950	1950
Haynes.....75	Own.	6-3½x5⅞	132	34x4½	2395	b2395	2395	....	3395
Haynes.....55	Own.	6-3½x5	121	33x4	1645	1595	....	2295	2595
Haynes.....48	Own.	12-23⅛x5	132	34x4½	2895	3595	2895	....	3895
Holmes.....Series 4	Own.	6-3½x4¼	126	34x4½	....	b2500	2500	b3300	3600
Hudson.....Super 6	Own.	6-3½x5	126	34x4½	....	b1695	1745	2570	2650 1795k
Hupmobile.....Series R	Own.	4-3½x5½	112	32x4	1250	1250	....	1835	1935
Jackson.....638	Cont.	6-3¼x4¼	121	32x4½	....	1485	b1685	2985	2985
Jewett.....Six	Own.	6-3¼x5	112	31x4	1065	1065	....	....	1395
Jordan.....MX	Own.	6-3⅛x4¾	120	32x4	1895	1795	....	2785	2785
Kenworthy.....8-90	Own.	8-3 x5½	130	32x4½	5000	5000	5250	6000	6000
King.....K	Own.	8-3 x5	120	32x4½	1795	1795	b1795	2400	2550
Kissel.....45	Own.	6-3⅛x5½	124	32x4½	n2385	1885	2385	b2975	3075
Kline Kar.....6-55-K	Cont.	6-3¼x4½	121	33x4	1790	1790	1790	2850	2890
LaFayette	Own.	8-3¼x5½	132	33x5	3985	b1090	4090	5000	5175
Leach.....999	Own.	6-3¼x5½	134	32x4½	6500	6500	6500	6500	6500
Lexington.....22	Anst.	6-3¼x4½	123	32x4½	....	1745	....	....	....
Lexington.....T-22	Anst.	6-3¼x4½	128	32x4½	....	....	2285	....	3350
Lexington.....ST-22	Anst.	6-3¼x4½	122	32x4	....	2100	....	....	....
Liberty.....10-D	Own.	6-3½x5	117	32x4	1295	1295	b1345	2085	2245
Lincoln	Own.	8-3⅝x5	130	33x5	$3800	b3800	$3300	$3900	$4200
Locomobile.....48	Own.	6-4½x5½	142	35x5	....	b7600	7600	10500	11000
Maibohm.....B	Own.	6-3½x4½	116	32x4	1395	1395	b1495	2165	2165
Marmon.....34	Own.	6-3¾x5⅛	136	32x4½	3385	b3185	3185	3985	4385
Maxwell	Own.	4-3⅝x4½	109	31x4	885	885	....	1385	1485
McFarlan.....1922	Own.	6-4½x6	140	33x5	6300	b6300	6300	7500	7500
Mercer.....Series 5	Own.	4-3¾x6¾	132	32x4½	3950	b3950	c3950	4850	5250
Merit	Cont.	6-3¼x4½	119	32x4	1895	1895	....	....	....
Mitchell.....F-50	Own.	6-3½x5	120	33x4	a1490	1490	b1600	2050	2275
Mitchell.....F-50	Own.	6-3½x5	127	32x4½	....	....	1690	....	....
Monroe.....1922-S-9	Own.	4-3¼x4½	115	32x3½	875	875	....	....	....
Moon.....6-40	Cont.	6-3⅝x4¼	115	31x4	....	1295	....	....	1695
Moon.....6-48	Cont.	6-3¼x4½	122	32x4	1785	1785	2285	2785	2785
Nash.....691-96-97	Own.	6-3¼x5	121	33x4	1360	1390	b1540	....	....
Nash.....692-94-95	Own.	6-3¼x5	127	34x4½	....	....	1540	2090	2390
Nash Four.....41-4	Own.	4-3⅝x5	112	33x4	965	985	....	1485 1295k	1645 1350k
National.....BB	Own.	6-3½x5¼	130	32x4½	a2475	b2475	2375	3725	b3250
Noma.....3C	Cont.	6-3¼x4½	128	32x4½	2000	b2100	c2200	....	3200
Noma.....1D	Bea.	6-3½x5¼	128	32x4½	3000	b3100	c3200	....	5500
Norwalk.....430-KS	Lyc.	4-3½x5	116	32x3½	...	1035	....	....	....
Oakland.....6-44	Own.	6-2¾x4¾	115	32x4	1120	1145	b1265	1685 1285k	1785
Ogren.....6 T De Luxe	Cont.	6-3⅝x5¼	134	33x5	b3750	3750	3850	4500	4800
Oldsmobile.....43-A	Own.	4-3¼x5¼	115	32x4	....	1145	b1145	1645	1795
Oldsmobile.....46	Own.	8-2⅞x4¾	122	33x4½	....	b1735	1735	....	2635
Oldsmobile.....47	Own.	8-2⅞x4½	115	32x4	1595	b1595	....	2145	2295
Overland.....4	Own.	4-3⅜x4	100	30x3½	550	550	...	850	895
Packard.....Single-Six	Own.	6-3⅜x5	126	33x4½	2485	2485	u2250	3175	3275
Packard.....Single-Six	Own.	6-3⅜x5	133	33x4½	....	u2350	2685	....	3525
Packard.....Twin Six	Own.	12-3 x5	136	35x5	3850	3850	3850	5240	5400
Paige.....6-44	Own.	6-3½x5	119	32x4	1465	1465	u1290	1995	2245
Paige.....6-66	Cont.	6-3⅝x5	131	33x4½	a2495	n2245	2195	3100	3155
Paterson.....22-6-52	Cont.	6-3¼x4½	120	32x4½	....	1550	1585	2595	2595
Peerless.....56-S-7	Cont.	8-3¼x5	125	34x4½	....	b2790	2790	3500	3790
Pierce-Arrow	Own.	6-4 x5½	138	33x5	7000	b6500	6500	8000	8500
Pilot.....6-50	H-S.	6-3¼x5	126	32x4½	2050	2000	2050	2950	3000
Premier.....6-D	Own.	6-3⅜x5½	126⅜	33x5	3150	b3100	3250	4300	5100
Premocar.....6-40-A	Falls.	6-3½x4¼	117	32x4	1095	1095	...	1750	1825
R & V Knight.....R	Own.	4-3¾x5	116	32x4	....	....	1665	....	2385	2475
R & V Knight.....J	Own.	6-3½x4½	127	32x4½	2475	b2475	2475	3015	3105
Reo Series...B-T6 & U6	Own.	6-3⅞x5	120	33x4	1595	....	1595	2355	2435
ReVere.....C	Dues.	4-4¼x6	131	32x4½	3200	3200	....	....	4000
Rickenbacker.....A	Own.	6-3½x4¾	117	32x4	....	1485	....	1885	1985
Roamer.....6-54-E	Cont.	6-3½x5¼	128	32x4½	2850	b2595	2785	3850	3850
Roamer.....4-75-E	Dues.	4-4¼x6	128	32x4½	3985	b3585	b3750n	....	b4650
Rolls-Royce	Own.	6-4½x4¾	143½	33x5	....	10,900	....	....	....
Saxon.....125	Own.	4-3½x5	112	32x4	1195	1195	....	1795	1795
Sayers Six.....DP	Cont.	6-3¼x4½	118	33x4	1695	1695	....	2795	2795
Seneca.....L-2 & O-2	Lyc.	4-3½x5	108	30x3½	875	875	....	....	....
Seneca.....50 & 51	Lyc.	4-3½x5	112	31x4	1095	1095	....	....	....
Sperling.....A	Supr.	4-3⅝x5	114	32x4	980	980	....	1685	1685
Standard.....98	Own.	8-3¼x5	127	34x4½	2150	b2500	2500	2750	3200
Stanley	Own.	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six	Cont.	6-3¼x4½	118	33x4	1765	1765	....	2750	....
Star	Cont.	4-3½x4¼	102	30x3½	r319	s348	u285	580	645
Stearns Knight....SKL4	Own.	4-3⅜x5⅝	125	34x4½	2250	2250	2450	3150	3450
Stephens.....90	Own.	6-3¼x4½	122	33x4½	1575	b1595	c1625	2450	2550
Stevens-Duryea.....E	Own.	6-4⅛x5½	138	35x5	7250	b6900	6800	u5600	b8900
Studebaker.....Light Six	Own.	6-3½x4½	112	32x4	1045	1045	....	1375	1750
Studebaker...Special Six	Own.	6-3½x5	119	32x4	1425	1475	b1475	2150	2350
Studebaker.....Big Six	Own.	6-3⅞x5	126	33x4½	....	n1985	1785	2500	2700
Stutz	Own.	4-4⅝x6	130	32x4½	2950	b2990	c2990	3990	4450
Templar.....A-445	Own.	4-3⅜x5½	118	32x4	2025	2125	b2175	2785	2785
Tulsa.....E-1-2-3	H-S.	4-3½x5	117	33x4	1175	1175	....	....	....
Velie.....48	Cont.	6-3¼x4½	115	32x4	1585	1585	b1800	2485	2485
Velie.....34	Falls.	6-3⅛x4½	112	32x3½	1235	1235	....	1750	2085
Velie.....58	Own.	6-3½x4¼	115	32x4	1395	1395	....	2085	2185
Westcott.....C-48	Cont.	6-3½x5¼	125	32x4½	....	....	1890	....	2890
Westcott.....A-44	Cont.	6-3¼x4½	120	32x4	....	1690	n1890	....	2690
Wills Sainte Claire..A-68	Own.	8-3¼x4	121	32x4½	2475	2475	....	3275	3475
Willys-Knight.....20	Own.	4-3⅝x4½	118	32x4	1350	1375	....	1875	2095
Winton.....40	Own.	6-3¾x5½	132	35x5	3400	b3600	3400	4450	4550

a—3-passenger. b—4-passenger. c—6-passenger. n—Sport. h—All Metal Type. k—Soft Top Type. u—Chassis Price. r—Price without starter and demountable rims. Price with starter and demountable rims $414. s—Price without starter and demountable rims. Price with starter and demountable rims $443. t—Model 47—34x4½ Tires.

Engine Make: Anst—Ansted. Bea—Beaver. Cont—Continental. Curt—Curtis. D.Ly—Dort Lycoming. G-B—Grey Beal. H-S—Herscaell-Spillman. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenberg. Supr—Supreme. Weid—Weidely. Wisc—Wisconsin.